

## ARCHIVES OF OTOLOGY.

### AN INSTRUMENT FOR REMOVING FLUIDS FROM THE TYMPANUM.

BY DR. SCHALLE, OF HAMBURG.

Translated by James A. Spalding, M.D., Portland, Maine.

Since the beginning of our medical knowledge of the diseases of the ear, it has been well known that fluids may be present in the tympanum, with and without perforation of the memb. tym. If physicians in former times were unable to diagnose this condition accurately, they often learned "ex juvantibus," that they had guessed correctly. We owe it chiefly to the works of Schwartze \* and Politzer † who could support themselves upon the experience of others, and upon improved methods of examination, that the diagnosis and treatment of these affections have reached their present stage of development.

Since it was never doubted, but that the presence of fluids in the tympanum, of no matter what consistency they might be, must cause decided harm, everyone strove eagerly to

\* a, Studien und Beobachtungen über die künstliche Perforation des Trommelfells. *Arch. f. Ohrenheilk.*, Bd. ii, 24, 239, 245; Bd. iii, 281; Bd. vi, 171.

b. Die Paracentese des Trommelfells, Halle, 1868.

† a. Ueber bewegliche Exsudate in der Trommelhöhle. S. A., *Wien. Med. Presse*, 1869.

b. Therapie der beweglichen Exsudate in der Trommelhöhle. S. A., *Wien. Med. Wochenschr.*, 1870, Nos. 35, 37, 39, 41.

c. Ueber die Anwendung des Trommelhöhlencatheters. S. A., *Wien. Med. Wochenschr.*, 1873.

d. Ueber die Entfernung beweglicher Exsudate aus der Trommelhöhle. S. A., *Wien. Med. Wochenschr.*, 1874.

e. Ueber die Anwendung des Paukenröhrchens. S. A., *Wien. Med. Wochenschr.*, 1878.

find means for their removal ; some of which I will mention briefly :

1. Syringing of the tympanum from the tuba outward by a catheter.

2. Suction by the catheter to empty the tympanum.\*

3. Suction of the exudation from the tuba outward, by means of the tympanic catheter.†

4. Politzer's method was used, after the patient had bent his head towards the side opposite the diseased ear, and very much forward.‡

5. Suction of the secretion by a Pravaz' syringe, which was pushed through the memb. tym. from the ext. aud. meat.§

6. The catheter, Politzer's or Valsalva's method used methodically for some time, in order to cause resorption of the fluids in the tympanum, by their continual pulverization.

All of these methods have been praised by some, rejected by others, while the fact is, that in most cases, they all leave us in the lurch.

The best means remains undoubtedly the paracentesis of the memb. tym., which Busson || suggested as treatment for the removal of exudations. After his time, many agreed with his views, while it is Schwartz's merit in having been the first to sharply define the indications and technique of this operation. I refer ¶ to his publications in order to turn my attention exclusively to the removal of the exudation, after the paracentesis has been made.

The fluid often escapes at once after a successful operation, if this does not happen we drive it out by Politzer's method, the catheter, or Valsalva ; if these then do not succeed in removing the tenacious secretion, we usually resort\*\* to syringing with saline solutions, with or without the

\* Valeroux 1843. Rau, *Lehrb. d. Ohrenheilk.*, 1856, §122.

† Weber-Liel, *Monats. f. Ohrenheilk.*, 1869, pag. 23.

‡ Ueber die beweglichen Exsudate in der Trommelhöhle, pag. 10.

§ Hinton. The diseases of the ear, by Toynbee, with a supplement by James Hinton, mentioned by Schwartz. *Arch. f. Ohrenheilkd*, Bd. v, pag. 220.

|| Dissert. An absque memb. tym. apertura topica in concham injici possint. Paris, 1748. Haller's Diss. chir. ; tom ii, No. 44, pag. 235.

¶ See note on preceding page..

\*\* Schwartz. *Arch. f. Ohrenheilk.*, Bd. vi, pag. 188.

catheter. Politzer\* expresses himself decidedly against all abundant injections of saline solutions, because they may excite the mucous membrane of the tympanum and the edges of the wound to rapid inflammation. The same author recommends† that we should for this purpose resort to rarefaction of the air in the aud. meat., which can be easily accomplished by sucking with the mouth the end of an india-rubber tube, which has been inserted air-tight, and he advises us at the same time to have Valsalva done from behind. We must add however, that Politzer also uses the Weber-Liel tympanic catheter in order to force the air through the tube into the tympanum, and then the exudation out of the latter.‡

Gruber, moreover, described a syringe§ for the suction of fluid substances from the middle ear. He suggested this to prevent the dangerous pulverization of pus toward the mastoid cells, which catheterization often causes. From the drawing which is given in natural size, this syringe is 15 *cm.* long, 9 *cm.* of which belong to the canula, which is 2–2.5 *mm.* thick. These measurements, as well as the relatively slight angle of the canula near the piston, the relatively large angle at its point, and especially the *stiff* union between the syringe and the canula, may admit of the suction of purulent masses from the tympanum in chronic purulent inflammations of the middle ear with larger and more or less round openings, but they must be a decided obstacle when we desire to pass the point of the canula, through a speculum for examination or operation, between the edges of freshly-made perforation wounds, which are usually but slightly gaping. In such cases, diminution of space, accompanied with defective illumination, and diminished freedom of manœuvering, must occur. These are my reasons for rejecting this instrument, and seeking for another more handy. The result is my present exudation-sucker, which I have used exclusively for this purpose for fully four years, abandoning all other methods.

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\* *Lehrb. der Ohrenheilk.*, 332.

† *Therapie der beweglichen Exsudate*, 18 fo, pag. 16.

‡ *Ueber die Anwendung der Pankenhöhlencatheters*; 1872, pag. 8.

§ *Monats f. Ohrenheilk.*, viii, No. 12.

This instrument consists of a fine canula, 4 *cm.* long, and 1.4–2.5 *mm.* thick, running into a funnel-shaped closed tube 4 *mm.* in entire circumference, increased by a small ring-shaped prominence, which bends at nearly right angles from the anterior, thin, horizontal part of the canula. (See figure. I.)

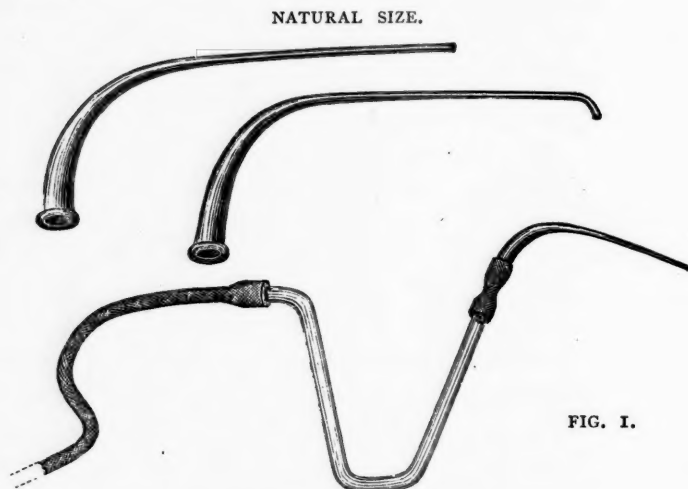


FIG. I.

ONE-THIRD OF NATURAL SIZE.

The thicker part of the canula is united by a short india-rubber tube with a glass tube bent at an angle, to the end of which again a rubber tube about 30 *cm.* long is united. In order to gain the largest possible calibre in so thin a tube, and on the other hand to avoid oxydation as much as possible, the canula piece is wrought of massive fine silver, without soldering.

If I desire now to use this suction-instrument, after the perforation has been made, I take the rubber tube into my mouth, pass with my right hand the glass portion of the instrument into the aud. meat., through the same speculum which I had left in the ear after the operation, push the point into the tympanum between the edges of the wound, and make suction. The introduction through the speculum and the edges of the perforation is very easily accomplished, because the whole field of operation is illuminated by the mirror directed by the left hand, and with exception of the



fine silver suction-tube, nothing interferes with the light. If no more exudation follows the first movements with the mouth, as we notice by the bubbling sound, we withdraw the canula, blow out its contents, if not very copious upon the left hand, so as at once to notice its consistency, and then repeat the method as many times as is needful. If the exudation is very tenacious, it is more difficult to remove on account of the large surfaces of adhesion at the entrance to the antrum, and especially at the floor of the tympanum lying deeper than the lower edge of the memb. tymph. In such a case, we follow up with a canula bent about 3 *mm.* near the point, directing it backward and upward inside the tympanum. This procedure, however, is difficult in the case of very sensitive patients, after a freshly made perforation, and we must naturally act here very gently. If the exudation is very moderate, we do well meanwhile to cleanse the instrument by removal of the canula, in blowing the glass tube free; because the secretion adhering to it prevents the fluid within the tympanum from entering into the canula. We use now the straight and now the curved canula, according to the condition of the exudation, and, when practicable, the latter is always convenient, because its point, directed straight forward, passes more easily between the edges of the wound than the one that is bent.\*

We can make use of any sort of ear specula for the operation and suction, but the hard rubber operation-specula used by Weber-Liel seem to me the most useful for these purposes, as well as for all operations to be undertaken upon the memb. tymph., or in the bottom of the meatus.

I have, however, modified these a little, in so far as I have had them made of an oval form.† They have very thin

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\* It does not do to use only one canula, and to bend it every time when needful, because such fine tubes must be bent from the beginning, and besides this, with the thinness of their walls, they would soon become knotted.

I formerly had not used the silver adjustment with a glass tube bent angularly, but united it directly with my mouth by means of a rubber tube. But after I had once received into my mouth, at the very first draught, a very copious, and, at all events, a very thin exudation, I resorted to the use of the glass tube, in the cavity of which an abundant amount of secretion can be collected.

† Deicke, instrument-maker, Johannisstrasse, Dresden.

walls, and on account of their small size (2 *cm.*) and very steep conical form, they can be introduced deeply into the meatus, and directed by the little finger of the left hand, while the two first fingers of the same hand hold the illuminating mirror. In this way, especially with these small ear-specula, we find it most easy to operate, etc., without the head-band, the use of which is always inconvenient, and which we do best in avoiding as long as we can. I use this latter only in the difficult cases, where I have to make a path for operating instruments, *e. g.*, the smallest cautery to the lowest part of the memb. tymp., which, as is well known, is most withdrawn from observation by the external curvature of the meatus, and especially in the case of very sensitive patients, like nervous people and young children,

The galvano-cautery is much more to be recommended for perforation, than sharp instruments. I employ three cauterizers, the conducting wires of which have a transverse diameter of 2.5–3.0 *mm.*, a perpendicular diameter of only 2.0 *mm.*, and an anterior cauterizing-surface of 2.0 *mm.*, 1.5-*mm.*, and 1.0 *mm.* These cauterizers occupy but little light on account of their extreme curvature and small size, so that they can be introduced through narrow specula, and with good control of illumination, to every district of the tympanum for the destruction of granulation, and to every portion of the memb. tymp. for paracentesis. The openings made by the galvano-cautery are of a rounded shape, and have smooth edges. In this way they offer a greater chance than the edges of incised wounds for the exit of secretions from the tympanum. I would mention additionally, that we should *always* make the cauterizing surfaces white-hot, because with red-heat we gain less sharpness.\*

Besides its use in the suction of exudations after paracentesis, the suction-instrument serves to remove pus, mucus, etc., in otitis media pur. chron. Every practitioner knows how hard it is, in spite of syringing, and the use of numerous little wads of charpie, or cotton introduced with thin-

\* In testing the heat we must be very careful, since such small cauterizers burn through in a moment if the current is but moderately strong. If we have freshly-filled v. Bruns' elements, we should use only one-quarter element. The cauterizers can be found at optician Schwenke's, Hamburg, Steindamm.

branched forceps, to cleanse the diseased mucous membrane thoroughly from the tenacious fluid that covers it, in order then to quiet it with the proper remedy, astringents, etc. Ever and anew, new pus comes from the tympanic cavity still covered with the remains of the memb. tymp., and we soon have to ask ourselves whether we do not do more harm by long continued manipulation, than we can remedy by astringent or cauterizing treatment. Nevertheless, without precise cleansing, a cure, if not impossible, (natural cures prove that) is put off to a later date. Here now the new instrument comes in play, since we can push the bent part of the canula into the hidden district, keep it under control of the light, and remove the fluid by suction. In the same way we succeed even when the meatus is swollen, in removing pus and detritus through the canula, which we have pushed into the bottom of the meatus. In the latter cases it often happens that suddenly no more fluid will follow, since some bit of tissue has been drawn in at the bottom, which naturally cannot pass through the canula. Hence we do well in withdrawing this together with the choked canula, in order straightway to bring out such firmer masses.

The instrument is further available for syringing deeper-lying portions of the tympanum for which purpose Politzer recommends the Weber-Liel tympanic catheter. In order to do this, we place the syringe itself into the glass tube, or in order to gain more mobility, we insert a piece of india rubber tube between the two.

We can further use the suction-instrument, for cleansing fistulous passages which open from the mastoid process to the ext. aud. meat., and outward.

We might further employ the instrument to inject various remedies, just after we have made a perforation, and so oppose the new-formation of secretion; a procedure which could only make itself available for the chronic catharrhal form.

Finally, I should like to ask, whether in cases in which we should introduce remedies into the tympanum, it would not be better to provide a canula, like that on my suction-instrument, with a steel point to push this from the aud.

meat. through the memb. tymp. into the tympanum, in order in this way to introduce remedies through the canula by means of a small syringe, than to rely upon so unsafe a procedure as a catheter and Provaz syringe, since in most cases, only the entrance to the tube and portions of the throat that are quite unaffected are touched. Since experience teaches us with how little reaction the usual paracentesis operation is followed, no real suspicion could be raised against such a therapeutical procedure.\*

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\* The exudation-sucker is made by Deicke, Instrument-Maker, Johannisstrasse, Dresden.

A CASE OF CLOSURE OF THE AUDITORY MEATUS  
AND LOSS OF HEARING BY THE FORMATION  
OF EXOSTOSES, COMPLICATED WITH ACUTE  
PERFORATIVE INFLAMMATION OF THE MIDDLE  
EAR, WITH REPEATEDLY RECURRING GRANU-  
TIONS—RESTORATION BY THE USE OF LAMI-  
NARIA AND GALVANO-CAUTERY.

BY S. MOOS, OF HEIDELBERG.

Translated by J. A. SPALDING, M. D., Portland, Maine.

**M**R. H., a medical student, consulted me for the first time May 6, 1878. *He had never had any disease of the ear, but had become totally deaf on the right side within the last two days.* Neither pain nor subjective sensations of hearing nor a discharge had preceded the deafness; on the whole the patient does not know what to offer as the cause of the disease. Besides deafness, he also complains of a feeling of fulness in his right ear.

*Present state.*—All tuning-forks are heard from the bones of the cranium upon the diseased side; he also has bone-conduction for watches, ticking with various degrees of intensity. A watch that should be heard at 9 *m.* was heard by air-conduction only when on contact with the right ear; voice was understood at 1 *m.* Examination showed at about the middle of the ext. aud. meat. :

*a.* A large globular exostosis springing from the posterior wall of the ext. aud. meat., and completely filling its whole calibre. This exostosis bears upon its upper circumference a second smaller one, resting upon the larger with a broad base, and running somewhat to a point in the direction towards the upper wall of the meatus. Its surface is dull-white, while the cutaneous envelope of the large exostosis appears red and thickened. The gap which the large globular exostosis still leaves open in front and upward is filled (*b.*) by a more club-shaped exostosis running towards the anterior and upper one in a circular direction with its thinner portion extending downward and its thicker portion upward; between

this and the anterior upper surface of the large globular exostosis is a small hollow, through which, however, it is impossible to penetrate any deeper inward with the probe. The cutaneous envelope of *b* resembles that of *a*.

This was evidently a case of *acute closure* of the ext. aud. meat., due to the presence of bony excrescences; the examination with the probe had not left the least doubt as regards the bony nature of the excrescences. On account, however, of the peculiar nature of their coverings, it might be merely a transitory closure, and I therefore decided upon a more expectant treatment.

Until May 10th I ordered instillations of a weak solution of zinc sulph. ; indeed the condition seemed to improve somewhat since the hearing distance for the *g m.* watch increased to 0.35. But as pains ensued, although quite moderate, I omitted the astringent. May 13th, the surface of the swelling showed slight purulent discharge, and as the hearing distance sank again I tried the application of laminaria. A laminaria rod 2 *mm.* thick was introduced into the fissure before described, and an attempt was made to retain it in position by plugging the meatus with wadding. It remained in position twenty-four hours, but violent and constant pains lasted until it was removed, when it showed itself swollen to 5 *mm.*, not in circumference, but along its orifice. The probe then penetrated somewhere further inward than before, but not entirely through. Hearing distance, 0.50.

*May 15th.*—Violent purulent discharge; repeated application of a laminaria rod 1 *mm.* broad. Violent pains at evening, which diminished on the morning of the 16th. The laminaria lies still as on May 15th, and was left for another day, with continued pain. Two days later, it was swollen to 5 *mm.* in circumference. The fissure between the anterior and posterior exostosis was enlarged, and the surface of the latter suffused with blood.

In this condition the patient was presented at the clinic May 18th. Abundant purulent discharge, and moderate pains were present until May 20th. May 21st: He was free from pain, but there was the same abundant purulent discharge from the surface of the exostosis. The treatment was slight after May 18th, with the exception of cleanliness. The pains renewed themselves on May 22d, and the fissure seems somewhat broader; hearing



distance 0.70. May 23d : The surface of the exostosis was cauterized with lapis infernalis, causing pain which extended into the concha ; abundant purulent secretion, but otherwise no alteration of condition. May 24th : He was free from pain, and a laminaria rod, 1 mm. thick, was introduced. May 25th : It was removed after twenty-eight hours, having caused incessant and violent pains during the whole period. The rod was swollen to 5 mm. in circumference. The surface of both exostoses was excessively granulated, and the fissure choked by the granulations, which grew luxuriantly till May 27th, when they were removed with the snare, causing excessive bleeding. May 28th : He was free from pain, and the granulations, which had begun to sprout, were again cauterized. May 29th : Early in the morning he has *excruciating pains in the bottom of the ear, spreading over the temple, forehead, and occiput*, and lasting till May 30th.

"Early this morning I felt as if something had broken in my ear." Very considerable discharge with diminution of pain. For the first time to-day, we could pass the 2 mm. thick end of the probe, beyond the exostoses in front and above ; hearing distance 0.60 ; instillations of warm water.

*June 1st.*—The pain is less, and the discharge excessive. A granulation is visible just beyond the former place of closure, and is cauterized at the clinic with the galvano-cautery. June 3d : The space between the exostoses is larger, discharge considerable, and pain slight. The perforation-sound is heard on using Politzer's method, while blood and pus are driven from the fissure between the exostoses there is still a large granulation, which is removed with the snare. June 7-14 : Shows but slight alteration. June 14th : Hearing distance 0.45 ; there is no pain, and the discharge is decreasing. Water does not flow into the throat on syringing, and the perforation-sound with Politzer's method is scarcely noticeable. June 17th : The granulations have grown anew beyond the exostoses, and are removed by the galvano-cautery. The patient syringed his ear with solutions of alum till June 26th. June 27th : Discharge of blood, with recurrence of the granulations which were destroyed again with the galvano-cautery. June 29th : The same.

*July 2d.*—The same treatment was continued on account of the repeated growth of the granulations. July 6th : A large piece of the granulation fell off, accompanied with bleeding ; galvano-caustic treatment. July 9th : The secretion is almost null, and

there is not a trace of granulations. A whisper is heard at 4 *m*. July 13th: The discharge has wholly ceased, and a whisper is heard at 6 *m*; and July 20th, at 8 *m*. July 22d: The ear is quite dry, and the covering of the globular exostosis is dry and pale. *The anterior exostosis has wholly disappeared.* The exostosis *a*, with the smaller one resting upon it, is the only one that remains. A narrow open space was found between the large exostosis and the lower anterior wall; the space in front and above was so large that we could see the anterior-upper quadrant of the memb. tym. The hearing distance was 6 *m*. for a watch of 9 *m*. hearing-distance. The patient is wholly free from every annoyance and has the same feeling on both sides, when air is driven in by Politzer's method.

*Nov. 30, 1878.*—The patient's condition is the same as on July 22d. All tuning-forks are heard on the right side by bone-conduction and Politzer's acoumeter at 10 *m*.

I should like first of all to add a few words about the peculiar form of the exostosis described as *b*. As I mentioned, it had great resemblance to a club, into the concave handle of which, if we continue the comparison, the upper anterior convex segment of the exostosis *a* pressed, and filled up the space. We might indeed almost believe that the form of the smaller exostosis had been altered by the pressure of the larger one growing against it. The final hermetical closure of the ext. aud. meat. took place, indeed, in front and above, at which spot also the operative attack was made. The closure was due to an inflammatory swelling of the soft parts, and made itself noticeable in the very beginning, by the almost complete deafness, long before the appearance of the purulent discharge. The granulations between the exostoses were probably due to the introduction of the laminaria, and probably also to the fruitless cauterizations with lapis infernalis. I regard the granulations springing from the bottom of the meatus, as symptoms of purulent perforative inflammation of the middle ear. For *these* granulations, the application of the galvano-cautery proved of great benefit. On account of its frequent application, and the extreme narrowness of the field of operation, it was impossible to avoid a simultaneous

cauterization of the exostosis *b* and this might have contributed most to its destruction, which was confirmed at the end of the treatment.

If the application of laminaria contributed decidedly to the enlargement of the closure, the lion's share in the perfect cure of the case belongs to the galvano-cautery. It is very probable, that we could have reached our goal in this case with the use of galvano-caustics alone; but future observations will decide this possibility.

The acute perforative inflammation of the middle ear ensuing in the course of the disease, was indeed secondary, and due to propagation from the external auditory meatus.

## THE USE OF TOYNBEE'S ARTIFICIAL EAR- DRUM.

BY CHARLES E. HACKLEY, M. D., NEW YORK.

SOME years since were published\* histories of several cases of perforation or absence of the drum membrane, which were greatly benefited by the use of Toynbee's artificial ear-drum.

This little appliance does not seem to be so generally used as it deserves, possibly because it has been tried in unsuitable cases, or because of the neglect of some apparently trifling rule for its use.

Hence it may, perhaps, be admissible to return to the subject, without having anything new to say on it beyond giving hints as to the employment of the artificial membrane, which personal use has proved to be advantageous.

Yearsley, in telling how the cotton plug recommended by him is to be adjusted, says: "But care must be taken that the entire opening be not covered, otherwise the experiment will not succeed. It is also indispensable to success that the moisture of the wool should be preserved."

This quotation may indicate two of the several points to be considered. 1. Why not cover the "entire opening?" So you may and should if the Eustachian tube be pervious; otherwise, by hermetically sealing the opening in the *M. T.*, you will replace the deafness due to imperfect drumhead by that due to sunken drum, etc. 2. Why should the "mois-

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\* *American Journal of Medical Sciences.*

ture of the wool" be preserved? If the plug becomes dry it absorbs moisture from the middle ear, and it seems as if one of the chief uses of an artificial drum membrane would be to keep the mucous membrane of the middle ear moist and in a perfectly pliable state, thus enabling the ossicula which it envelopes to move with perfect facility. When the drumhead no longer acts as a protector, the watery portion of the mucous evaporates, not so rapidly, of course, as it would if more completely exposed to the air, but sufficiently to leave a dry, crusty residue.

The quotation from Yearsley thus interpreted would lead us to secure permeability of the Eustachian tube and apply an artificial drum of such a character as will not absorb the secretions from the mucous membrane and will protect it from the atmosphere. The best instrument that we at present have for this purpose is Toynbee's artificial membrana tympani.

Perforation of the drum membrane is rarely the sole lesion; when it exists we shall usually find thickening of the membrane lining the tympanum, derangement of the articulations of the ossicles, otorrhœa, etc., etc. These, of course, will demand our attention before we can hope for benefit from introduction of an artificial mem. tympan. But when by proper treatment the amount of discharge has been limited, the protection afforded by Toynbee's instrument, is often an aid in treatment. I have several times seen perforations heal under its use with no other treatment than syringing with warm water.

About the introduction of the instrument it is unnecessary to say anything more than Toynbee says in his Text-book; after it is in position I often find it advantageous to apply the end of a rubber tube, over the wire handle, into the meatus, and by a quick blow drive the rubber close against the remains of the membrana tympani.

The full improvement of hearing that may be hoped for is rarely attained at once, but often it may be half an hour after the introduction of the instrument before any great change is observed, and the full benefit is often not attained for some days.

After the rubber has been trimmed to fit the ear, and the wire handle has been cut to the proper length, the patient can readily introduce the instrument and soon learns to place it better than the surgeon can.

To recapitulate: the cases which have seemed to be benefited by the use of Toynbee's artificial drum are those where the Eustachian tubes were pervious and where extensive damage had not been done to the ossicles by the previous inflammation. Moreover, the benefit is not always immediate; and in my experience the improvement in hearing has often been proportionally greater for the voice than for the watch.



## FOUR CASES OF SEVERE DISEASE OF THE MASTOID PROCESS.

By S. MOOS, OF HEIDELBERG.

Translated by J. A. Spalding, M. D., Portland, Maine.

CONSIDERING the abundant literature bearing upon the subject now before us, in which the works of Shwartz (so well known to every aurist) on the surgical opening of the mastoid process have the preëminence, a series of only four cases, even if they are chosen from many others, must appear *very modest*. And yet, if I come forward publicly with these cases, it is wholly in the interest of the diagnosis and symptomatology of those diseases of the mastoid process, in which the osseous part of the auditory meatus is chiefly involved. Of the cases here communicated, which were complicated for the most part with subsequent affections of the brain, or pyæmia, or both, the extreme posterior portion of the mastoid process in two cases remained entirely free in every respect. Three of the cases ended favorably, the fourth fatally.

CASE I.—*Purulent perforative inflammation of the middle ear, after measles, followed by caries with necrosis of the mastoid process, and formation of polypi on the posterior wall of the bony aud. meat. Rapid healing after removal of the sequestrum.*

R. W., æt. 12, was brought to me by his mother, May 17, 1875. The disease of the boy's right ear developed itself rapidly two years before, after measles. A discharge from the ear follow-

ed quickly after violent pains, and has lasted until to-day. Besides this, as I was informed, a swelling came on about nine months afterwards behind the ear, accompanied by the formation of "growths" in the ext. aud. meat., with a bloody discharge. The swelling behind the ear opened, and discharged much pus; it filled again at a later date, was treated by the family physician with tincture of iodine, and the growths in the ext. aud. meat. were cauterized.

*Present State* : Bone-conduction for all sources of tone continues on the diseased side; the comprehension of speech is direct. The right auricle stands out almost at a right angle to the surface of the skull; the mastoid process is red, swollen, and tender on pressure, with a distinct feeling of fluctuation. A moderately granulated fistulous opening is discovered at about the middle of the swelling. The external meatus is filled with several polypi springing from the posterior bony wall, just at the point of junction of the cartilaginous with the bony meatus. The sound, when introduced, touches upon rough patches in the region just described.

I was unable, by syringing with water, to establish a communication between the fistulous opening in the mastoid process, and the carious patches in the ext. aud. meat. I first rested my diagnosis on caries of the mastoid process, and then basing myself upon the results of the bone-conduction, I declared, in case the affections of the bone ran favorably, that the relative restoration of hearing was possible, although a deeper glance into the ext. aud. meat. could not be gained on account of the alterations present. Above all I emphasized the necessity of a free exit of the pus from the mastoid process by an external incision.

The mother said she would think it over, but did not return until June 4th. The boy's condition had in the meanwhile grown much worse, the flow of pus had almost wholly ceased, and violent headache set in, but *only on the diseased side*; feverishness followed, and there were many attacks of chills, (the last one four days before) together with thirst and constipation.

*Present State* : Local condition the same as before; pulse 84, temp. 38. The pupils were alike and movable. There was no organic trouble in the body except in the ear. The patient remained under my treatment and subsequent observation until Dec. 17, 1875. I quote the following abstract from the long history of the case :

Wilde's incision was made on the next day under chloroform, and the granulations described were removed with the snare. The bone was found to be very rotten. The thick-bladed knife ran deeply into it, and a large amount of thick, offensive pus escaped. The water injected into the mastoid process flowed easily through it, and then out from the ext. aud. meat. The probe when introduced towards the ext. aud. meat. touched upon rough patches. I could not demonstrate the mobility of a sequestrum that was possibly present. June 6th, the patient feels very well; temp. 37.4; pulse 80. Spontaneous defecation. Local state the same as yesterday.

The treatment in the following month was confined especially to a preservation of the communication between the two openings, and to nourishing food. This left nothing to be desired in so far as the general health was concerned: but on the other hand, the granulations in the ext. aud. meat. grew again luxuriantly so that by the middle of July, the purulent discharge from the ext. aud. meat. stopped once more, and the water syringed in at the mastoid process did not flow from the meatus, until the sound had been introduced into the openings in the bone. In order to relieve this state of things, the granulations in the ext. aud. meat. were again removed July 15th. The case continued now satisfactory, and August 21st, the patient was sent home with the needful directions.

*September 30th*, I saw him again for the first time. The granulations had indeed grown again, but without prejudicing the communication during syringing. They had also taken a position further outward in the ext. aud. meat., and on using the sound, a sequestrum, movable with much difficulty, was found behind them. An attempt at extraction, as well as another on October 14th, was unsuccessful. The patient went home again for a week; October 21st, the sequestrum showed itself much more movable, and I succeeded in extracting it.

The sequestrum, covered with numerous granulations of small-cell structure, was 13 mm. long, 1 cm. wide, 8 mm. at its thickest portion, and 5 mm. at the thinnest. The posterior wall of the aud. meat. showed an irregular opening, covered with luxuriantly granulated edges; the lower wall was bulged outward at two spots lying behind one another, and excessively granulated.

To-day, for the first time, we could view the memb. tymp.; its larger part lay in contact with the wall of the labyrinth; the

lower and posterior quadrant and the anvil were absent ; the stirrup was clearly seen in its isolated position.

*Oct. 30th.*—The patient was wholly cured with exception of a slight purulent discharge proceeding from the region of the membr. tymp., on account of which he remained under observation until the middle of December. Both openings in the bone had closed. The lower wall of the bony aud. meat. showed two bulging hyperostotic elevations. The mastoid process remained sunken. The general health was satisfactory, and whispered words could be heard at 10 m. I saw the patient for the last time in the summer of 1878.

In the case just reported, I have laid the main stress in the treatment upon the maintenance of the passage of the wound in the bone. For this reason I acted more passively, after this aim had been reached by Wilde's incision, even towards the granulations, the removal of which was only indicated and undertaken when a stoppage of the pus was threatening. It was indeed impossible to think of their radical destruction before the sequestrum had been removed. The favorable course, and the lasting cure which finally ensued, have justified the therapeutic treatment.

*CASE 2.—Purulent inflammation of the ear in youth, with caries and necrosis in the mastoid process. Cure (?) Renewed acute inflammation several years later in the mastoid process, with formation of abscess and renewed necrosis on both sides. Meningitis, pyæmia. Cure.*

Gustave Herm, æt. 18, basket-maker, of Ketch, consulted me November 23, 1875. The patient suffered in his youth from a discharge in his right ear. Eight years ago a swelling appeared behind the right ear, and opened after a short time. Violent pains preceded the opening of the swelling, and the wound finally closed. The discharge from the ear continued, and small bones are said to have come from the meatus. Finally the discharge also stopped, and he became deaf in the right ear.

About ten days ago, as we learn, violent pains upon the right side followed a cold, and not only in the ear, but also on the *whole right half of the head.*

*Present state.*—There is a scar about 2 cm. long upon the sunken mastoid process, which is not at all sensitive to pressure, and shows no other alteration except the scar. The ext. aud. meat. is filled with a pale-red fluctuating growth, which can be passed by the sound in front and beneath; backward and upward it is united with the corresponding walls of the meatus.

*Diagnosis.*—Abscess in the anterior and outer segment of the mastoid process.

*Therapeutics.*—The abscess was opened by a large incision, which gave exit to a large amount of pus without decided relief. The patient said that he would come on the next day, but did not report until December 2d, when he was driven to the clinique in a wagon. In the interval his condition had grown decidedly worse. He had had chills, the pains in his head became terrible, and spread out, not only over the *left half of the cranium, but also over the neck, the spinal column and the extremities*. The patient had also often been delirious.

Several large polypi were found to-day, filling the meatus at the point where the abscess had been opened. Since we already had here a case of meningitis (complicated, perhaps, with pyæmia). I sent the patient to the medical clinique of Dr. Friedreich, where he was treated (also intercurrently by myself) until he was discharged from the hospital.

Here follows an abstract of the history of the case, as kindly communicated to me by Prof. Fürbringer:

The patient entered December 2, 1875; for history see above.

*Present state.*—The patient is well nourished. There is an old scar behind the right ear, offensive pus in the ext. aud. meat., and polypoid growths. He lies with his eyes shut, his mouth open, groaning, and answering only slowly and with difficulty. He is difficult to arouse, and feverish; his pulse is strong, but not remarkably frequent. His pupils are alike, and moderately dilated. He has slight stiffness in the neck. His heart, lungs, etc., are free.

Urine; 1018 sp. g., without albumen.

TEM. PULSE: TEM. PULSE:  
Morning. Evening.

Dec. 2.	—	—	38.2.	88 :	Ice bags on the head. Three
Dec. 3.	38.4.	80 :	38.6.	80 :	leeches behind each ear; chloral.
					Ears syringed with 1 per cent. solution of salicylic acid.

- Dec. 4. 37.6. 84 : 38.4. 80 : Salicylate of soda, 5 grams daily, in solution.
- Dec. 5. 37.8. 88 : 38.6. 92 : Little or no sleep, and very slight abatement of the pain. Groaning is almost continuous. In the urine, spontaneous phosphatic sediment containing many crystals of oxalate of lime. Frequent grinding of the teeth, probably from pain.
- Dec. 6. 38.7. 88 : 38.8. 88 : Chills. Neck stiff and painful.
- Dec. 7. 38.2. 80 : 39.2. 76 : Sensibility, etc., normal.
- Dec. 8. 38.2. 80 : 38.8. 80 :
- Dec. 9. 38.2. 76 : 39.0. 80 :
- Dec. 10. 39.2. 84 : 38.0. 84 : A fluctuating swelling has formed behind the right ear, in these last few days, and is now incised, evacuating pus, pulpy, reddish-brown masses, and a small sequestrum from the mastoid cells. The opening communicated with the ext. aud. meat., on syringing.
- Dec. 11. 37.6. 80 : 39.2. —
- Dec. 12. 38.4. 88 : 39.0. 84 : Several granulations were removed from the ext. aud. meat.; but some still remained upon the carious patches (Sequestrum?). General state is better. Memb. tym. not visible. Perforation-sound, when the air is forced through.
- Dec. 13. 36.3. 80 : 40.0. 88 : Ice bags continually on the head. Sodæ Salic. Perfect cleanliness and syringing. Aqua laxativa. Chloral hydrate at evening.
- Dec. 14. 38.8. 84 : 37.8. 88 :
- Dec. 15. 38.0. 80 : 39.2. 92 :
- Dec. 16. 37.8. 100 : 39.0. 92 :
- Dec. 17. 39.0. 88 : 39.0. 100 :
- Dec. 18. 37.4. 76 : 39.0. 88 :
- Dec. 19. 38.2. 84 ; 38.8. 80 : Exacerbation of pain which continues with less fluctuation in its intensity. Pupils alike.
- Dec. 20. 38.0. — : 37.2. 88 :
- Dec. 21. 38.1. 96 : 38.0. 88 :
- Dec. 22. 38.1. 88 : 38.6. 92 :
- Dec. 23. 38.2. 84 : 38.2. 80 : Stiffness in neck is less. Groaning and sighing almost continually.
- Dec. 24. 38.3. 88 : 38.5. 92 :
- Dec. 25. 37.0. 88 : 39.0. 92 : Left pupil wider than the right. Quinia 0.3, four times daily.



Dec. 26.	36.6.	80 :	38.4.	88 :	
Dec. 27.	37.8.	92 :	39.0.	92 :	
Dec. 28.	37.6.	— :	38.0.	88 :	No decided improvement. The secretion from the ear is less offensive. Quinia is omitted.
Dec. 29.	37.4.	80 :	37.8.	100 :	The wound on the mastoid process has granulated.
Dec. 30.	37.8.	92 :	38.6.	92 :	
Dec. 31.	38.0.	92 :	39.6.	96 :	The difference in the pupils is now present, now absent. Morphia 0.01, subcutaneously. Remarkable effect; pain is slight.
1876.					
Jan. 1.	37.8.	88 :	38.4.	88 :	
Jan. 2.	36.8.	68 :	37.0.	76 :	
Jan. 3.	36.8.	72 :	38.3.	92 :	Sleep. Morphine Muriat. 0.01-0.015, subcutaneously daily.
Jan. 4.	37.0.	88 :	38.2.	80 :	
Jan. 5.	36.8.	72 :	37.8.	104 :	Very deep narcosis. Vomiting (effect of morphia?). No complaints.
Jan. 6.	37.2.	80 :	36.6.	80 :	
Jan. 7.	36.8.	72 :	36.2.	72 :	Great restlessness, with the head buried in the pillows. He gives no answers. Retention of urine; catheterization.
Jan. 8.	36.2.	84 :	36.8.	68 :	
Jan. 9.	35.2.	72 :	37.2.	— :	
Jan. 10.	37.2.	88 :	37.0.	72 :	Blood and pus in the urine, the retention of the urine has ceased. General condition better, pains less, and he answered calmly.

From Jan. 11-15 there was no more fever, but the left pupil was continually wider than the right.

*Jan. 16th.*—Slight exacerbations. The paroxysms of pain are mostly brief. The irrigations of the ear were continued daily, and also the injections of morphia. The patient leaves his bed.

*Feb. 5th.*—Urine free and without albumen.

*Feb. 17th.*—Examination by Prof. Moos, who discovered in the bottom of the meatus a still immovable sequestrum, covered with granulations, some of which were removed. The region of the memb. tymp. still invisible.

*Feb. 19th.*—Same state. Both of the openings in the mastoid process communicate very well, no matter from which side we syringe.

*Feb. 22d.*—Feels quite comfortable. The communication is still present. The secretion is scant and without odor. There is no

difference between the pupils. The patient was discharged at his own request.

After a purulent inflammation of the ear, with caries and necrosis of the mastoid process, had been present in youth, a new inflammation ensued many years later, in the mastoid process after a cold, first in the external anterior, and some time later in the external posterior segment, likewise with caries and necrosis. Meningitis and pyæmia were also associated with the inflammation of the ear. In this case also, the same treatment was adopted as in the former. Unfortunately the patient did not report again. It was impossible to speak of a cure at the time that he left the hospital. Nevertheless, so far as the sequestrum was concerned, if he had returned later I should scarcely have acted differently than in the former case. The cure of the severe complications, in spite of the long duration of the original disease, is to be considered very noteworthy.

CASE 3.—*Discharge from the right ear in youth, which had apparently stopped until about three months ago. At the time there was violent inflammation in the anterior segment of the mastoid process and the neighboring wall of the ext. aud. meat. Acute caries of the segment affected, as also of a part of the antrum mastoideum and the annulus tympanicus. Multiple formation of polypi at the lower and anterior wall of the ext. aud. meat. Enormous masses of so-called cholesteatomatous masses in the cavities affected by the inflammation. Threatening brain symptoms. Permanent cure, with a large cavity remaining, made up of the outer and middle segments of the organ of hearing. Loss of the anvil. Partial restoration of hearing.*

Johann Hauck, shoemaker, from Hasloch, Palatinate, æt. 29, consulted me Jan. 29, 1877. He had suffered from his youth until about twelve years ago, with a discharge from the right ear, without any especial annoyance. It had then nominally ceased. Three months ago, pain came on in the bottom of the right ear, spread gradually more and more outward and laterally, and gradually assumed a truly furious character, from which he had been

unable to gain even the slightest relief by medical help at his home. The pain behind the right ear was almost entirely null. On the other hand, in the last four days, violent headache set in and spread out over the right half of the cranium, accompanied by repeated vomiting, loss of appetite, obstinate constipation, thirst, and fever.

*Present state* :—The patient looks very pale and suffering. Pulse 110, and rather weak ; temp. 38.6. Pupils unaltered. The outer region of the right mast. process looks normal, and is not sensitive to pressure or percussion.

Several granulations are present in the ext. aud. meat., close to the end of the first third, and at the anterior and lower wall, but they become plainly visible only when a reddish, soft growth, filling the region of the posterior and upper wall of the ext. aud. meat. is pushed aside with the probe. A more accurate examination proved that this growth, together with its coverings, was intimately connected with those of the corresponding walls of the meatus, and that it could be nothing else than a space communicating with the cells of the mastoid process filled with soft contents.

Strict diet was ordered ; senna in the morning, morphia at night. The granulations on the anterior and lower walls of the meatus were removed, and an incision made into the posterior swelling, when I was not a little surprised to find that without meeting with any resistance I could pass forward from 3-4 *cm.* with the knife in an oblique direction. A large amount of offensive pus escaped, also partly cholesteatomatous and partly more purulent masses, and the wall of the abscess fell forward in the form of a large polypoid swelling. Very decided but not quite perfect relief followed at once. In spite of large doses of morphia, the pains in the ear, in the head, as well as the constipation and vomiting, continued in the following days. It was not until Feb. 6th that a decided improvement appeared, together with the disappearance of the symptoms just mentioned.

After the incision had been made, onion-like scales of epithelium overlying one another, partly yellow or yellowish-white, and partly shiny, escaped daily from the cavity of the abscess, which, however, did not grow smaller. *Feb. 6th.*—I therefore removed a large portion of the polypoid and prolapsed wall of the abscess with the scissors, and then removed some really enormous collections of cholesteatomatous masses, partly with the forceps, and partly with

a broad hard rubber spoon. After the wall of the polypoid abscess which still remained, had retracted, I reached with the probe into a cavity abundantly filled with granulations, and made up of the interspace belonging in common to the ext. aud. meat., and the anterior segment of the mastoid cells.

All the subjective symptoms now ceased as if by magic, but the patience of the patient, as well as my own, was still put to a severe proof. *For fully three weeks* these cholesteatomatous masses evacuated themselves *daily*, or were removed with the forceps: the last on Feb. 28th. About this time, diffuse, connected, and partially uneven hyperostoses showed themselves on the lower wall of the ext. aud. meat., while the granulated portions everywhere diminished at a later stage. After the perfect cure which ensued at the end of the first week in March, the following state was confirmed:

Destruction of the cells of the whole anterior segment of the mastoid process, together with the neighboring wall of the bony ext. aud. meat. in front, with the exception of a small portion united with the cartilaginous wall; also of the posterior segment of the annulus osseus, and the outer and lower bony frame of the antrum mast. We could push the probe 6 *cm.* forward in an oblique direction towards the medial wall of the antrum. The posterior half of the memb. tymp. and the anvil was wanting. The anterior half and the handle of the hammer was ankylosed with the wall of the labyrinth, and the stirrup was isolated. The patient could repeat with ease all words spoken at a distance of 6 *m.* Experiments with the tuning fork showed that the labyrinth had remained quite intact.

The patient in this same state, once more quite healthy and capable of work, reported twice at the clinique in the summer of 1877.

It is very unfortunate that I was unable to make a microscopic examination of the masses removed until they had lain for a long time in Müller's solution. I found no cholestearin, but only large polyedrical cells without nuclei, and only a few with nuclei.

The case just reported bears much resemblance to that which Bezold published in November, 1877.\* In its development also, it appears similar to the mode which Bezold has so clearly described. A purulent inflammation

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\* *Archiv f. Ohrenhklde.* Band xiii, heft 1, pag. 26, *et seq.*

of the ear, which had been present in youth, was the starting point of the disease, for which the condition of the memb. tymp., as described, may serve as proof. A space of twelve years of perfect health filled up the interval between the cessation of the original outbreak and the renewed affection. New inflammatory symptoms then arose without special causation. The pain assumed the most violent character, and here is the point at which, as regards the interpretation of the symptoms, I would direct attention to a condition not stated by Bezold.

We cannot doubt but that the origin of the concentric masses of epidermis in the mastoid antrum even though their growth was latent during many years, was connected with the previous inflammation of the ear. Just as little can we deny a pressure-atrophy from the ever-increasing growth of the masses in the bony parts adjoining it, when we consider the products of the pathological anatomy.

How enormous these disturbances can be is proved, amongst others, by my own observations on the cadaver, which Bezold also cites. See ARCH. OF OPHTHAL. AND OTOL., Vol. iii, 2 p. 202, etc.

But in the end, indeed, a rapidly advancing osteoporosis and an acute caries in the outer and middle segment of the petrous bone associated themselves to the original disease. The abundant discharge of pus when the incision was made, and especially the extraordinarily violent character of the pain, are in favor of this view.

In regard to other circumstances, it is noteworthy in our case that the outer surface of the mastoid portion was without swelling, and on the whole quite free from alterations, and as insensible to pressure as to percussion.

This short clinical case goes to show that swellings and enlargements of the posterior wall of the aud. meat. are not so very rare. Still they are not absolutely trustworthy in a diagnostic point of view, as indicating the presence of a collection of cholesteatomatous masses. In such cases we may have to do with a real abscess of the mastoid cells, or even with a large cold abscess. An error in diagnosis, however, would be of subordinate importance in so far as thera-

peutics are concerned. We should always make an incision. But whoever reckons, under all circumstances, in meeting with decayed and incisible bone, will have many a disappointment to undergo.

The following case teaches much in this respect :

*CASE 4.—Purulent discharge from both ears in youth, which ceased until the age of twenty-four. At that time repeated attacks of violent inflammation in the left petrous bone. Formation of abscess in the anterior segment of the left mastoid process. Cerebro-spinal meningitis ; pyæmic cystitis, and poly-arthritis, followed by death. No post-mortem.*

Wilhelm Scharf, a shoemaker, æt. 24, of Helmstadt, consulted me May 10, 1878. The patient had a discharge from both ears when six years old, without any known cause. At a later date it ceased completely. He then remained healthy, and served as artillerist during the Franco-Prussian war. Three months ago he had renewed trouble with his ears. At this time he was attacked with pains in the left ear which lasted uninterruptedly for three days and three nights, and spread over the whole left side of the head. There was however no discharge, and an interval of five weeks of seemingly perfect health ensued. Seven weeks ago the same attack repeated itself with violent fever, again without discharge, and again with a pause, until within four days. Since this time the patient has had continuous pains in the left ear, but not in the left half of the skull, nor has he been feverish.

*Present state.*—Pulse 76, temp. 37. The right mastoid process is sunken on its outer surface and shows a scar about  $\frac{1}{2}$  cm. long. The vessels of the handle of the hammer of the right memb. tymp. are hyperæmic, the short process prominent, the posterior fold extremely developed, and the mucous membrane thickened. Hearing  $1\frac{1}{3}$  m. for Politzer's acoumeter. Hearing on the left side is null for air-conduction. All tuning forks are heard by bone-conduction on the painful side. The labyrinth, therefore, is free. The left ext. aud. meat. is completely filled with a white, compressible growth, which is painful on pressure, and lies in contact with the posterior and upper walls. The outer surface of the mastoid process is unaltered and is not painful to pressure or percussion.



*Diagnosis.*—Caries in the anterior segment of the mastoid process. I emphasized to the patient the gravity of his disease, and the necessity of his coming to Heidelberg to remain under my care. He said that he would talk it over with his family, and begged me in the meanwhile to treat him as an out-patient. I made an incision into the swelling of the ext. aud. meat., more blood than pus followed the incision, the swelling did not collapse, and on using the probe, I found indeed that the wall of the aud. meat. was rough, but I could nowhere find a communication between the abscess-swelling and the cells of the mastoid process.

*May 14th.*—The patient was free from pain until to-day, and therefore declared anew that he would not come to Heidelberg to stay. The local state had altered, in so far as the edges of the wound had assumed a granulated condition. The aud. meat. remained blocked up. Some thickened purulent secretion escaped from the wound. Sounding gave the same result as lately.

I ordered luke-warm irrigation for the ear and warm poultices.

*May 21st.*—Perfect health until day before yesterday, so that patient went to his work. Violent pains in the ears and in the temples had been present day and night since day before yesterday, but early this morning they abated. There is but slight discharge. The growth in the ext. aud. meat. is as before. The incision was repeated without causing any alteration. Patient was urged once more to come to Heidelberg, and remain for treatment, but all in vain.

*May 28th.*—The patient presented himself for the last time. He has now continuous and violent pains in the forehead; his pulse is 130, and he has no appetite. There is much pus in the abscess in the ext. aud. meat., which is removed by pressure and with the hard rubber spoon. Probing gives the same result as before, and afterwards the patient feels much relieved. He was ordered the same treatment as before, and eventually ice bags to his head. Dr. Frey in Neckarbischofsheim, was summoned May 29th for advice by the patient's family, and communicated to me the following report of the further course of the case:

"The patient, whose consciousness was still perfect, told me that after Prof. Moos had treated his ear, he had been perfectly well; while walking up and down the Heidelberg railroad depot, he had been attacked suddenly with dizziness and violent sickness, followed by vomiting. With full consciousness he then made his way into a neighboring restaurant, and later, in spite

of violent pain and sickness he went by railroad to Helmstadt, from which place he could with difficulty reach the first station where his father was the keeper. His parents made cold applications for him throughout the night. I was called early the next morning.

The patient complained of very violent headache, tearing and lancinating pains in the extremities and in the back. The abdomen was drawn inward. While I was present he vomited several times; the pulse was very slow, temp. 39.2; the pupils reacting slowly, and his eyes were fixed.

There was also strabismus. The sensorium was wholly free. The muscles of the neck were drawn backward. A serous fluid mixed with blood flows from his left ear. The patient desires to lie on his back, with his legs and arms outstretched. All his other functions are normal.

Ordered Apperients, ice bags; some leeches to the left mastoid process, and at evening some doses of quinia.

*May 30th*—Symptoms are the same; temp. 38, but no vomiting. On using the ear-speculum we see a still larger flap at the place where polypoid growth is inserted, on moving which more blood appears. The mastoid process was not painful on forcible pressure.

The patient was very restless towards evening.

*June 1st*.—Condition the same; temp. 39.5.

*June 2d*.—The patient considers himself much better; temp. 39.2.

*June 3d-4th*. The same.

*June 5th*.—Retention of urine; the urine evacuated by the catheter contained pus. Chills: temp. 39.8; the sensorium much affected.

*June 6th*.—Same state.

*June 7th*.—Pyæmic inflammation of the hip joint, with very considerable exudation. Very violent pains in other joints. The lungs in front are free, but an examination behind was impossible on account of opisthotonos.

Ordered morphia injections on account of extreme restlessness.

*June 9th*.—The patient died. A post mortem was not allowed in spite of all our endeavors.

The explanation of the case before us is difficult. Until the patient came under my charge, the case resembles the former one in every particular. The disease of the ear in

youth, its cessation for several years, the violent pains ensuing in the last three months, although step by step and with long intermission, suggested the possibility of a cholesteatoma causing inflammation by its growth. But both causes together did not succeed in penetrating or breaking down the bony posterior wall of the ext. aud. meat.

What did the swelling in the ext. aud. meat. mean? Was it the symptom of a simultaneously present periostitis, or of a cold abscess? Many points are in favor of the last assumption. Amongst others the rough condition of the bone on probing, the size of the growth remaining unaltered after the repeated incisions, etc.

I described a similar case in my autopsies of ear-disease. First series, ARCHIVES OF OPHTHALMOLOGY AND OTOL-  
OGY, vol. iii.

In the whole course of the disease however, as well as in the state of the parts concerned, the way to treatment was clearly pointed out by nature herself, and this consisted in the attempt which was indeed not difficult to accomplish, to open the cells of the mastoid process from the ext. aud. meat. I could not make up my mind to operate unless the patient would remain in Heidelberg. But he could never be persuaded to come for more than from time to time to the clinique. It is doubtful, however, whether an operation would have saved his life.

## ON BRANCHIAL FISTULÆ AT THE EXTERNAL EAR.

BY DR. D. SCHWABACH, OF BERLIN.

Translated by JAMES A. SPALDING, M. D., Portland, Me.

THE *Monatsch. für Ohrenheilkunde*, (No. 9. 1878), contains a notice of Pagets' paper "on branchial fistulæ at the external ear," read before the Royal Medical and Surgical Society (*Lancet*, Dec. 1, 1877), and doubts Pagets' opinion as therein expressed, that these anomalies are not so rare as is usually believed. The editor also "has never yet seen anything of the sort." If now, indeed, the number of cases cited by Paget from past and contemporary literature is small, his supposition that they are by no means so rare, is thoroughly established. Leaving aside the previously cited cases,\* Urbantschitsch† has lately communicated his experience in twelve cases that he has observed, "of fistula auris congenita or alterations at the external covering corresponding exactly with its orifice." Since 1876, I have observed seven cases of this rudimentary development, and they seem to me to be so much the more worthy of communication, as they are well fitted to confirm the observations made by Urbantschitsch, particularly as regards their *hereditary transmission*.

The anomaly in question was found in four male and

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\*Heusinger: Virchow's *Archiv.* xxix, 26. Schmitz: Ueber *Fist. Aur. Cong.*, Inaug. Diss., Halle a S 1873. Schede. s. bei Schmitz. Pflüger; *Monatschr. für Ohrenheilkunde*, 1874. II.

†*Monats. für Ohrenheilkunde*, 1877. No. 7.

three female individuals. In four cases it was present on one side only, in three on both sides. The situation of the rudimentary development in six cases was in front of the helix, at 2-3 *mm.* distance, and about 1 *cm.* from the tragus. In one case only did it have the form of a dimple as large as a pin's head, in the concha auris at the crus of the helix. In another case besides a shallow dimple at the usual situation in front of the helix, another one precisely similar was present in front of the first and about 5 *mm.* distant. As regards the form of these rudimentary developments, I found in six cases a mere dimple as large as a pin's head, and in one case only could I establish the existence of a genuine fistulous canal, into which the probe passed 5 *mm.* upward and downward, while forward and backward it could not be pushed further than the length of its head (2 *mm.*) In this case as in two others, a creamy fluid containing abundant pus corpuscles escaped from the fistulæ from time to time. In all these three cases, moreover, the rudimentary development was present on both sides, but in every case the secretion came only from one side. In two of these cases besides, a purulent obitis media was present in the very side from which there was a secretion from the fistula, and the individuals affected also believed that their ear affection stood in connection with these fistulæ. That this was not the case, was proved as well by examination with the probe, as by syringing into the fistulæ, neither of which procedures could demonstrate any communication between the fistula and the middle ear. In the third case, in which there was a secretion from the fistula, the organ of hearing was proved to be perfectly normal, so that in this case also it was impossible to imagine a connection of the fistula with the middle ear. Again, in another case, a dimple that had no secretion was found in a female patient with chronic otorrhœa (otitis externa) on the same side. No other anomalies could be discovered in the organ of hearing in the remaining cases. All these facts, but especially the circumstance that even in the cases with secreting fistula it was impossible to demonstrate their communication with the tympanum (as also in the cases cited by Schmitz

and Pflüger) are in favor of the assertion made by Urbantschitsch (l. c.) and proved by embryological studies that the so-called fistula auris congenita has no right to such a title, and that it is simply to be regarded "as a remnant of the original branchial fistula which in the normal condition closes completely." Urbantschitsch had already proved in a former work\* that the external and the middle ear do not in any way originate from the first branchial fissure.

Paget was also able to confirm by his own observation, the hereditary transmission of branchial fistulæ observed by Urbantschitsch in one of his cases. He found the fistulæ partly on one ear, partly on both ears in five children, their father and his sister. In my cases also, an hereditary transmission was repeatedly demonstrable. The following case offers the greatest interest :

Madame M., suffering from a chronic purulent catarrh of the middle ear with formation of polypi (right ear), offers on the same side and at the usual situation in front of the helix, a dimple as large as a pin's head, from which a creamy fluid containing abundant pus corpuscles escapes from time to time. A precisely similar dimple is found at the same spot on the left side, but without any secretion. The left ear is healthy. The patient informs us that her mother had, on both sides, one of her sisters and one of her children, on one side (she did not know precisely whether right or left) the same dimples from which, however, no secretion had ever issued. As I lately learned from the family physician, Madame M. has just given birth to a child, who shows on both sides at the helix, a dimple without any secretion.

Two other cases that came under my observation, were in brothers, one of whom, the elder (three years old) had on the right side a dimple as large as a pin's head, which had a purulent secretion from time to time, and on the left side a simple scar-like depression, while in the younger brother (one year old) I found on the left side only a superficial dimple without secretion. The parents of these children are free from similar anomalies. It was impossible to establish

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\*Ueber die erste Anlage des Mittelohres und des Trommelfelles," (Mittheilung aus dem embryol. Inst. des Prof. Schenck, in Wien; Band 1, p. 1-20. 1877.)



whether such had existed in the grandparents or other relatives. Finally, two cases in which such rudimentary formations were present in cousins, once on the right side and again on the left, might also be cited in favor of their hereditary origin. Here also nothing was known of a similar anomaly of development in the ancestors of these children; nevertheless, as Urbantschitsch assumes for his case, it might be indeed conceived "that in a previous generation of the families concerned, a fistula appeared, and after omitting several generations, showed itself again in later branches."

## ANALYSIS OF THE TONES INCLUDED IN THE SECONDARY NOISE OF AN INTERMITTING TUNING-FORK.

BY DR. E. BERTHOLD, OF KÖNIGSBERG.

Translated by JAMES A. SPALDING, M. D., Portland, Me.

WHILE examining my ear patients by means of the telephone,\* which I have used since Easter of last year, I accidentally discovered that the higher twelfth and the third of the second octave sounded at the same time with the fundamental tone of the intermitting tuning-fork. I could not at first succeed, even with the greatest attention, in perceiving the remaining overtones. The noise made by the skipping spark is particularly disturbing during this observation. Since the overtones ensuing in the secondary noise of the intermitting tuning-fork are of themselves only weak, it need not at all surprise us that they were never observed by anybody before the invention of the telephone.

The noise of the skipping spark is indeed noticeably enforced by the telephone which is brought into conducting communication with the intermitting tuning fork, but the simultaneous strengthening of the overtones belonging to the fundamental tone of the tuning-fork, renders their perception still more easy. But they can only be more accurately investigated by the help of resonators. Professor V. Wittich was kind enough to allow me the use of the resonators in the physiological institute (for which I owe

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\* See Verhandl. der Physiol. Gesellschaft zu Berlin, No. 6. Hartmann: "Eine neue Methode der Hörprüfung mit Hülfe electricischer Ströme."—Albert Wodke; "Ueber Hörprüfung." Inaug. Dissert. Rostock, 1878.—Berthold: "Das Telephon als Hörmesser." Vortrag auf der Natur Vers. in Cassel, 1878.

him my thanks) and it happened by a fortunate chance that the tone of my intermitting tuning-fork ( $c^1 = Do_2 = 256$  vibrations in the second) coincided precisely with the deepest tone of the series of tuned resonators that were at my service. I can so much the more assume as already well known, the description of Helmholtz' intermitting tuning-fork, as well as the Bell telephone which I have used, as they are the same instruments employed by myself for "the optical representation of the vibrations produced by the telephone." \* I repeat merely that my telephone, instead of the so-called mouth-piece, has an attachment tube which can be fixed very conveniently in the auditory meatus like an otoscope. A Daniel's battery of four elements was employed to set the tuning-fork into vibration. The galvanic current of this battery was so strong, that one could hear the tone of the tuning-fork through the telephone, away into the third chamber. A rattling secondary noise could be distinctly heard in addition to the fundamental tone of the tuning-fork. When the telephone was brought closer to the ear, the tumult of this noise was disagreeably loud and hindered an analysis of its separate tones. But at some distance off and with the unassisted ear, two harmonic overtones, the twelfth,  $Sol_3$ , and the third of the following octave,  $Mi_4$ , could, by careful attention, be recognized in the noise of the telephone together with the fundamental tone of the tuning-fork. By the aid of the resonators we could also discover the remaining harmonic overtones of the fundamental tone of the tuning-fork, and especially distinctly,  $Do_4$ ,  $Do_4$ ,  $Sib_4$  and  $Mi_5$ . The tones  $Sol_4$ ,  $Do_5$  demanded more attention, and  $Re_5$  was the weakest of all.

It is possible, however, that the resonators were not tuned in perfect harmony with the fundamental tone of my tuning-fork.† The individual tones of the globes of the resonators now made themselves audible to several observers simultaneously, when the funnel-shaped end intended for the

\* *Monatsch. für Ohrenheilkunde* No. 6, 1878.

† I suspect that the deepest tone of the resonators ( $c^1$ ) in my series was tuned to 264 vibrations.

auditory meatus was closed with the finger, and the telephone brought nearer to the other opening of the resonator; the globe of the resonator then acted like a resonance chest. The tones  $\text{Sol}_3$  and  $\text{Mi}_4$  were again the strongest. The smaller resonator globes sounded already at a distance of several inches, but the larger ones,  $\text{Do}_2$  and  $\text{Do}_3$ , had to be brought close to the attachment tube of the telephone, so that the volume of air inside might be set into co-vibration.

If the attachment tube was pushed a little way into the opening of a larger resonator globe, we succeeded sometimes in producing two simultaneous tones. After proof had thus been gained that the telephone, besides a rattling noise, also included the fundamental tone of the tuning-fork and the whole series of harmonic overtones belonging to the fundamental tone, the question was to decide at what situation the formation of the overtones occurred. It is well known that a tuning-fork by itself gives but one single tone, and includes no harmonic overtones. It is also impossible to look for the cause of their origin in the telephone. The only remaining supposition was, that the overtones observed must be included in the noise which originates from the skipping of the spark, and the regular dipping of the platina needle into the quicksilver cup of the intermitting tuning-fork. In order to prove this supposition, it was necessary to analyze this noise with the help of resonators, after the telephone had been switched off from its conducting communication with the tuning-fork. This investigation had to be carried on in the evening, at a time when absolute stillness reigned in the physiological institute. If the tuning-fork was placed on elastic rubber bags, so that the resonance through the table and floor was excluded, I did not succeed in hearing a single overtone without help of the resonators. On the other hand, if I used the resonators in this examination, I could hear  $\text{Sol}_3$  and  $\text{Mi}_4$  again very distinctly, and the remaining overtones somewhat weaker. In our observation of the weakest overtones we must guard ourselves from the error, to which we are so easily exposed, of not letting the resonator globe rest absolutely quiet in the external meatus. The slightest rubbing

of the resonators against the fingers or the walls of the meatus, is quite sufficient to hinder the perception of the weakest overtones. But it is quite different, as we have seen before, when we supplement the same investigation with help of the telephone, in which even the weakest overtones are perceptible without any difficulty. The shade, therefore, of a tone cannot undergo the slightest alteration in its repetition by the telephone.

The next question which I sought to answer had reference to the intensity of the overtones. I wished to ascertain whether by interpolating any obstacles to conduction between the electric battery and the tuning-fork, the weak overtones could be made to disappear sooner than the stronger. I made use of a rheostat as an obstacle to conduction; the number of units of resistance at which an overtone fell out should be the measurement of its intensity. This experiment gave me no positive result. So long as the resistance to conduction was not great enough to annul completely the vibrations of the iron plate in the telephone, the ear, the most sensitive reagent to tones, could hear the collective overtones with help of the resonators. A reagent by no means so sensitive as the ear, an easily moveable gas flame, to which the vibration of the air in the resonator could be conducted,\* showed, at all events, variations in the different overtones. The wave-lines of the flames from the resonators Sol<sub>3</sub> and Mi<sub>4</sub>, when observed in the rotating mirror, showed the highest eminences of the waves, even higher than the resonator Do<sub>2</sub>, which, however, coincided with the fundamental tone of the tuning-fork. It seems as if the considerable mass of air in the resonator Do<sub>2</sub> cannot be so easily set into energetic co-vibration. The resonators that were put into the weakest co-vibration, Sol<sub>4</sub>, Do<sub>5</sub> and Re<sub>5</sub>, did not show any visible wave-lines. The telephone, in direct conduction with the gas flame, gave, corresponding to the sum of tones and noises which it contained, an irregularly formed wave-line, which contained wave-hills with many summits, whereas the flame pictures of the whole

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\* Helmholtz : *Lehre von den Tonempfindungen*. 3 Aufl. Beilage iii, pag. 583.

series of resonators showed entirely regular wave-lines.

In concluding here my investigation I would also remark, that amongst the methods of observing the overtones, none offers for one who is unpractised so few difficulties as that by the telephone herein described. Even if we have no resonators, it is easy to succeed in finding from a large number of glasses or bottles, some which will easily correspond to and sound with one or another of the overtones. As this co-vibration does not at once cease when the glass has been removed from the telephone, we can, while carrying on this experiment, demonstrate to one standing at some distance away the proof of the presence of an overtone, as soon as we hand him the glass that is filled with an overtone.

In reflecting that the intermitting tuning-fork is used, not only for varying acoustic experiments, but also in later days to test the acuteness of hearing in ear patients, the knowledge of the tones included in the secondary noise of the tuning-fork might not be without some value.



A CASE OF ACUTE INFLAMMATION OF THE  
MIDDLE EAR, WITH INFLAMMATION OF THE  
MUSCLES OF THE NECK, AND FACIAL PA-  
RALYSIS OF THE SAME SIDE. RECOVERY.  
WITH SOME REMARKS UPON THE INDICA-  
TIONS FOR WILDE'S INCISION AND TRE-  
PHINING THE MASTOID PROCESS.

BY DR. D. B. ST. JOHN ROOSA, OF NEW YORK.

THE following case gave me so much anxiety on account of a difference of opinion occurring between very competent authority and myself as to the true significance of some of the serious symptoms, and as to the proper treatment to be pursued, that I report it, hoping it will be as instructive to my professional brethren as it has been to me.

*May 5, 1879.* Dr. S. æt. 43, a busy surgeon and medical journalist consulted me in regard to uncomfortable and painful sensations in his right ear. He was somewhat anæmic, jaded from overwork and he had an anxious appearance. He described the pain as extending from the right Eustachian tube to the drum, laying great stress upon the pain along the tube. The drum-head was red, the auditory canal normal. There was nothing marked about the pharynx. The hearing distance was not noted. Leeches were ordered to be applied to the tragus. I afterwards learned that he had slight nasal catarrh and headache with pain in right lower jaw on May 4. The next day I received a note from the patient stating that he did not feel able, on account of the pain, to come to my office, which was a very short distance from his. I found him in bed and apparently suffering very much. He complained of a pain like that from neuralgia,

extending over the right side of the scalp, face, neck, the right auditory canal, and the Eustachian tube. Leeches and the hot douche were prescribed. The patient then told me that he had suffered a few weeks before very severely from facial neuralgia, that he then had no aural trouble, that he had had very lately an inflammation of the muscles of the opposite side of the neck. The membrana tympani was vascular but not bulging. Knowing that this patient had been very much overworked, with an insufficient quantity of fresh air, and seeing that he was pale and hyper-sensitive, I considered the pain as out of proportion to the objective symptoms of inflammation, and I therefore made a diagnosis of non-suppurative inflammation of the middle ear, with neuralgia of the fifth and seventh pair. In other words, I believed that the otalgic symptoms predominated over those of true inflammation. Warm applications behind and over the ear were advised as well as the use of the hot douche. The hot douche was not well borne, nor was there much relief except at short intervals, from these measures. It should also be said that I laid great stress upon maintaining the nutrition, and a generous diet was insisted upon. On the fourth or fifth day the auditory canal was somewhat swelled but not tender. I incised the drum-head, but no pus and no mucus were evacuated. The hot douche was now freely used and afforded relief. A very moderate suppuration occurred in the tympanic cavity. Morphine was administered, *pro re nata*. The patient sat sometimes out of bed, but did only tolerably well, complaining at intervals of very severe neuralgic pain which was relieved by morphine. He took nourishment badly except in the intervals of freedom from pain. He was very much depressed in spirits. There was no tenderness nor any other inflammatory symptom on the mastoid or in the pre-auricular region. On May 15th—ten days after I first saw the patient, I went out of town to fill a professional engagement, and my associate Dr. E. T. Ely took charge of the case until May 25th, and his notes are as follows:

“Dr. S. Seems to be a case of acute suppuration of the middle ear, with considerable swelling of the auditory canal, slight discharge, no pain. 16th more pain and swelling, no discharge. 17th severe pain in whole right side of face and head and in the ear, not controlled by douche, no discharge, funnel shaped swelling of the canal, not very tender. Consultation with Dr. A. H. Buck. It was decided to incise the canal and re-open the drum-

head. This was done under ether. The opening in the drum-head was very free, and the canal was incised from the bottom to the entrance. Three leeches were then applied to the tragus and one to the mastoid. Hot douche was continued. No pus followed these incisions.

*May 18th.*—Pain most of last night. A little easier this morning. Discharge of pus beginning.

*May 19th.*—Comfortable until evening, then great pain in ear and head, temperature  $101\frac{1}{2}^{\circ}$ , three leeches to mastoid, douche, morphia. 20th not much pain; weak and depressed. A. M. T.  $98\frac{1}{2}^{\circ}$ , P. 88, P. M. T.  $100\frac{1}{2}^{\circ}$ , P. 88. Slept most of the day.

*May 22d.*—No fever yesterday or to-day, one attack of severe pain last night, canal red and swollen, free discharge since incision, four leeches applied, and hot douche for twenty minutes every two hours.

*May 24th.*—Pain part of every day, no fever, severe pain last evening quieted by morphia, slight mastoid tenderness and œdema last evening and this morning, less swelling in canal. Dr Buck was again called in consultation, he advised opening the mastoid by trephining. Dr. C. R. Agnew was called in the afternoon. He considered the case a typical one of mastoid disease of proliferous nature, but that no suppuration was going on there. He thought the disease was chiefly in the mastoid from the outset, and that there was meningeal congestion. By the ophthalmoscope the veins in the right fundus seemed a little fuller to Dr. A. and to Dr. Ely than in left. Dr. A. advised potass. iodide gr. x t. i. d., and increased to point of tolerance. Fld. ext. Ergot  $\frac{3}{4}$  j. t. i. d. sodii bromid. gr. xv at night. Keep ear and mastoid warm with cotton, and omit douche."

*May 25th.*—Very slight œdema and some tenderness over mastoid, and although only one dose of the iodide was taken, iodism was produced. Patient was awake all night from sneezing, and had some pain in the other ear. He is nervous and hysterical, buries his head in the bed clothes, and refuses to be comforted. He expresses the belief that he will not recover. On this date I met a gentleman with very large aural experience, and we went over the case very carefully. The patient seemed to be suffering very much and he located the seat of his pain by spreading out his hands like a fan over the right side of the head. The tenderness about the ear was not very great, and was found in the neck and occiput as well. The ear was discharging freely with healthy

pus. The mastoid was so slightly œdematous that I thought its condition might be due to the leeches and other applications. It did not seem to me to be a case of mastoid periostitis, nor did I think there was any meningitis or cerebral disease. Although I did not feel so sure of the former point as of the latter, I still thought the pain was neuralgic rather than inflammatory. Inasmuch, however, as Dr. Agnew had on the day before given the opinion that the mastoid was markedly involved, and that there was a meningeal hyperaemia, and as the gentleman now in consultation was much more decided in the opinion that the mastoid was the point of the origin of the pain, and moreover since my own judgment was a little doubtful and wavering, I advised that a Wilde's incision be made at once. If this incision failed to detect disease of the bone, I resolved to take no further operative steps at this time, although the gentleman in consultation afterwards stated to me, that he considered this but a step in the right direction, he believing that the bone should be opened, and that even if no pus were found, the bone fistula would do no harm. The incision was accordingly made, no disease of the bone was found. The wound was dressed to the bottom with lint, and a poultice was applied.

*May 28th.*—The pains in the head and neck are not at all relieved except when morphia is used in full doses. The tissues of the mastoid, pre-auricular region and neck were red, swelled, and tender at various points. These symptoms have increased since the incision. The depression of spirits continues, but at times the patient can be made quite cheerful by light conversation and after a dose of morphia. He is taking a moderate amount of stimulants, and milk very freely. Dr. William A. Hammond was called in consultation, his opinion was that there was no disease in the cranium, and that the pain was due to neuralgia largely modified by malaria. He advised that 60 gr. of quinine be given in twenty-four hours for two days, and that this treatment be followed up by small doses of arsenic. This treatment was followed by an apparent alteration of the pain, and not so much morphia was needed.

On June 3d the muscles of the neck were so much swelled that we pronounced them in a state of inflammation, and leeches were applied. The arsenic and generous diet, as far as patient would take it, with moderate doses of alcohol, were continued. The neck was especially tender where nerves made their exit. There

was no especial tenderness on the mastoid; the patient could scarcely move his head from side to side.

*June 7th.*—The conjunctiva and outside of lids of right eye are reddened; the ability to close the right eye is impaired.

*June 8th.*—Conjunctiva and lids less red than yesterday. Slight enlargement of gland at the angle of the jaw on the right side. Severe pain in the jaw and mastoid region. Morphine was freely administered hypodermically for its relief. A poultice was kept on the side of the face and the head. T.,  $101\frac{1}{2}^{\circ}$ ; P., 100.

*June 9th.*—Swelling at the angle of the jaw increased; pain severe, and facial paralysis on the right side well marked. The right lid does not completely close in winking. The right side of the face appears rounder and fuller than the left, and the mouth is slightly drawn towards the left. The tongue protrudes in a direct line, and there is no deviation in the uvula. There is apparently no disturbance of the sense of smell. T.,  $99\frac{1}{2}^{\circ}$ ; P., 94. Two leeches were applied behind the ear.

*P.M.*—Severe pain; mx. of Magendie's solution every three hours (hypodermically).

*June 10th, A.M.*—T.,  $98\frac{1}{4}^{\circ}$ ; P. 100. Slept well; took about 1 qt. of milk during the night. Facial paralysis increased. Ophthalmoscopic examination by Dr. Roosa. The appearance of the fundus is the same in both eyes, and nothing abnormal is seen in either. The ear discharges freely.

*P.M.*—Longer intervals of freedom from pain. No morphine since the 8th at 9 P.M.

*June 11th, A.M.*—T.,  $99\frac{1}{2}^{\circ}$ . Swelling at the angle of the jaw diminished. No pain since June 10th at 9 P.M.

*P.M.*—Pain recurs; not so severe. Chloral and bromide of sodium are given for its relief.

*June 12th, A.M.*—Patient slept badly. Pain returned in the old regions, the jaw, behind the ear, and over the right side of the head. T.,  $98\frac{3}{4}^{\circ}$ ; P., 94. Patient very much depressed in spirits. Morphia again administered. At 5 P.M. a consultation was held, at which were present Dr. Alfred L. Loomis, Dr. Henry B. Sands, Dr. Charles R. Briddon, Dr. W. M. Carpenter, and the attending physician, Dr. Roosa. After Dr. Roosa's statement that the pus was freely discharging from the auditory canal, and that in his opinion there was no retained pus in the bone, without claiming to decide the strictly *aural* points of the case, positively, the conclusion was reached by the consulting surgeons and phy-

sicians that the patient had no symptoms of intra-cranial trouble, that there was no indication for operative interference with reference to the mastoid process, or suppuration in any part of the neck; that supporting treatment was demanded. On the suggestion of Dr. Loomis the stimulant he was receiving was increased to  $1\frac{1}{2}$  oz. of whiskey every three hours, and pushed to 2 oz. as soon as it became evident that it did not disagree with his stomach.

*June 13th*—Patient feels very comfortable; has slept well, is taking 2 oz. of whiskey in a tumbler of milk every three hours, and has not experienced the slightest stimulant effect. Takes nourishment aside from the milk. T.,  $99^{\circ}$  in the morning,  $98\frac{3}{4}^{\circ}$  6 P.M.; pulse, between 96 and 100. Patient also takes citrate of iron and quinine. At 8 P.M. patient again complains of severe pain. Morphia administered at 9.30 P.M. At 3 A.M. on June 14th he was seen by Dr. Ely on account of great pain. Morphia was given at that time and one hour later. At 8 o'clock the pain was still unrelieved, and the swelling about the angle of the jaw and the mastoid process was very much increased. Morphia was freely administered p. r. n., and a consultation was held at 1.30 P.M., at which three aural surgeons and one general surgeon were present. The following opinions were given: Dr. ———, an otologist, saw no indication for operative procedure, while he believed there was mastoid disease. Dr. ———, also an otologist, believed that the patient was suffering from mastoid disease, and that trephining should be performed at once.

Dr. ———, aural surgeon, thought there was no serious internal trouble, that it was external, and that the patient was probably suffering from some kind of poisoning,—malarial? sewer gas? that no operation was advisable. The general surgeon thought that pus would be found somewhere about the stylo-mastoid process, and he thought that nature would relieve the patient by suppuration. He laid great stress on the continued application of poultices, and he was not in favor of operative interference to-day. Dr. Roosa adhered to his original opinion, that the patient had a moderate inflammation of the middle-ear, with great neuralgic pain, and that the swelling of the neck and facial paralysis may have been caused by the operative procedures already undertaken, and that trephining was not justifiable, but that it would be injurious. It was decided to continue the alcohol and to make the application of poultices very thoroughly over the neck and mastoid.



An examination of the urine on June 15th, gave the following result: Dark straw-color, acid, sp. gr. 1024, albumen in moderate quantity, casts 2, slightly granular, uric acid a little, pus a little, mucus a fair amount, oxalate of lime a little. June 15th. The ear is suppurating moderately. The drumhead is granular, canal moderately swelled, ear easily inflated by Politzer's method. The swelling in the course of the sterno-cleido mastoid muscle, and about the neck, seems to be increased, but the tenderness is not so marked. The symptoms point to abscess forming in the connective tissue, and in the muscles of the neck, and over the mastoid process. Dr. Roosa does not think there is retained pus anywhere in the head, or inside of the temporal bone. There is a particularly tender point,  $1\frac{1}{4}$  in. in a direction directly backwards and a little downwards from the lobe of the ear. There is scarcely any oedema about the Wilde's incision. T.  $99^{\circ}$ . P. 100.

3 P. M. The swelling has begun to subside. Dr.—, a general surgeon who had seen the patient on the 13th, saw the patient this afternoon, and thinks it possible there is pus in the petrous portion of the temporal bone, and that the swelling may be due to a temporary plugging up of the communication of the tympanic cavity.

Dr. Roosa thinks there may be pus in the cellular tissue, but does not think that it is necessarily connected with the tympanic cavity. The treatment was continued.

*June 16th.*—P. 98. T.  $99^{\circ}$ . Patient slept well. Dr. Roosa opened the track of the Wilde's incision with a probe. The swelling and oedema in the mastoid process and about the angle of the jaw remained the same.

Another consultation was held during the day, at which there were present two general surgeons, two otologists, and Drs. Roosa and Carpenter. One of the surgeons expressed the opinion that the patient's general condition had improved since he last saw him, but he declined to express any opinion in regard to the necessity for operative interference with the ear. He believed it *possible* that the operations already performed, might have aggravated the symptoms. The other general surgeon inclined towards trephining the mastoid. This should certainly be done in his opinion if there is a probability that there is not a free opening from the mastoid cells into the tympanic cavity, and this was a point to be decided by the aural surgeons. One of the otologists thought the patient better and that no operation should be done. The other aural expert believed that the bone

should be opened. Dr. Roosa stated that his opinion was unchanged, but that he had so much respect for the opinion of the gentleman who was so decided with regard to the necessity for an operation as well as for that of the one who was inclined towards it that he wished for further advice before he declined to open the mastoid. By agreement Dr. Robert F. Weir, who was for some years aural surgeon to the Eye and Ear Infirmary, and who is now surgeon to two general hospitals, was invited to see the patient independently and alone, at 9 o'clock this evening, without knowing any of the opinions that had been expressed until his own was formed. Dr. Weir gave the following opinion: that the disease is probably an inflammation extending down the external auditory canal in the angle close to the point where the facial nerve passes, and that it may perhaps involve the mastoid process. He is inclined to think it does not. There is no indication for surgical interference for the present. The general plan of treatment was therefore continued. June 17th. An examination of the urine made this day shows specific gravity 1020, and a well-marked trace of albumen. No casts. The general condition of the patient is improving, and the swelling about the neck is subsiding.

*June 19th.*—Patient is still doing well. Treatment has been continued.

*June 21st.*—Patient sits up and walks about, swelling of the neck nearly gone, no pain or tenderness, drumhead healed, hears the watch tick. The swelling, and redness of the neck reappeared for one day, while the patient was convalescent and alarmed him, but it passed away in a few hours. This was after the drumhead had healed. July 5th. Patient walks about, has been twice to the sea-shore, hears the watch one inch, facial paralysis improving under electricity. July 20th. A note from the patient states that he can hear the watch ten inches, the voice as well as ever, that his facial paralysis is gone, that he considers himself well.

*Remarks.*—I regret very much that the early notes of this case are not more full; yet I think they are sufficiently so to give my readers a fair idea of the first symptoms. It is probable, however, that the mere recital has not conveyed to the minds of those who have followed it a full sense of its doubtful features. They were such that, taken in connection with the patient's high professional position, they

gave me great anxiety lest I should omit to do my full surgical duty to the case. The more recent of the notes were taken stenographically by Dr. W. M. Carpenter, to whom the patient and I are indebted for intelligent and assiduous care.

The point to be settled during the course of the disease was this: Is there a hidden suppurative process going on in any part of the temporal bone which causes the pain, œdema, tenderness, cellulitis, myositis and paralysis of the facial? My answer to the question was, No. The severe paroxysmal pain did not arouse the suspicion in my mind that there was mastoid disease, because there was absolutely no well-defined tenderness, redness or œdema until leeches and poultices had been freely applied, and not until two paracenteses of the drumhead and very free incisions of the auditory canal had been made.

On the 25th day of May, when I saw the patient after an absence of ten days, there was certainly a moderate amount of œdema, and this led me, although I suspected it had been caused by the leeching, to advocate a Wilde's incision, especially as I then thought it a harmless procedure, and two otologists who had seen the patient with Dr. Ely thought the disease markedly involved the mastoid, although only one of them advocated any operative procedure. I now think that this incision was a mistake, and that to it we owe the increase of the inflammatory symptoms in the neck and the facial paralysis. Indeed I now believe, on a calm looking over of the case, that every operative interference, from my first paracentesis down to the Wilde's incision, was unnecessary, and that the traumatism needlessly aggravated the painful case. The key-note was struck in the proper management of the case, in my opinion, when the supporting, anodyne and anti-malarial treatment by means of milk, alcohol, morphia and quinine was vigorously entered upon.

I believe, furthermore, that the disease would have been more easily subdued if I had gotten the patient out of his house and by the sea-side before the graver symptoms set in. This I urged upon the patient and his friends, but without avail. It was simply a case of sub-acute, non-suppara-

tive inflammation of the Eustachian tube and tympanic cavity occurring in an anæmic and consequently neuralgic and hysterical subject. That he was anæmic was not only noted by me at my first interview, but when Dr. Loomis was called in consultation he stated that he had noticed the doctor's anæmic condition for a year.

Neuralgic he certainly was, for he had barely gotten through with a severe attack of facial neuralgia when the trouble occurred in the ear. The character of the pain during the whole course of the disease was not that arising from deep-seated trouble in the middle ear, but rather of a disease like neuralgia, in which there is an intensity at different times, and which has intervals of complete cessation. It was sometimes easy to divert the patient by light conversation or an anecdote for quite a long time, and on some few occasions the use of water in the hypodermic syringe was followed by as much effect as the employment of morphia. Now, the character of a pain caused by a severe inflammatory action in the tympanic cavity or mastoid process is such that no physician who has seen much of it would attempt to alleviate it by any diversion of the patient's spirits or by a placebo. Only positive means such as local blood-letting or division of the periosteum, will subdue this. I have long since recorded my experience\* that morphia alone will not mask the severe pain of an acute inflammation of the middle ear. As Von Tröltsch aptly says, an inflammation of the tympanic cavity is essentially a periotitis, and every surgeon knows of what little avail are drugs against the pain of this disease except when it occurs as a result of the deposition of syphilitic poison. It should have been said before that this patient had no syphilitic taint whatever.

I considered the patient to be nervous and hysterical, because he bore his pain very badly, and because he suffered from very great depression of spirits. It is not usual, in my experience, for a patient suffering from acute inflammation of the middle ear, to dwell very much on his prospects of recovery, or to be greatly depressed about his future. He is

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\* Transactions of the American Otological Society, 1875, page 89.

generally so much taken up with the severity of his pain as to have room for nothing else. Then there was something in the history of the house in which the patient lived which I failed to impress upon some of the gentlemen who saw him with me, which led me to believe, as was once independently suggested by Dr. Noyes who saw him two or three times, that there was an element of blood poisoning in the case, perhaps from sewer gas. Two members of the family had suffered from acute aural disease a few months before, and an examination made by competent authority late in the course of the case, showed that there was an escape of sewer gas in the cellar. I do not know that any special significance is to be attached to the presence of albumen in the urine, but so far as it goes, it indicates a somewhat deteriorated general condition. In analysing the case, I come over and over again to the conviction that the operations did harm. That traumatism such as the patient experienced in the paracentesis, and in the very free subsequent division of the membrana tympani, and the free incisions in the auditory canal, and the cut down to the mastoid bone, might induce adenitis, myositis, cellulitis, and that facial paralysis might result from pressure upon the nerve as it makes its way out of the stylo-mastoid foramen, I think does not admit of a doubt. Certainly, there never was any evidence that the facial suffered any lesion until after it had left the cranium and tympanic cavity. Besides, the swelling and paralysis occurred at a point of time which makes it possible to believe that traumatism may have caused them. But, the crucial test of the correct diagnosis was in the results of the case. There was no escape of retained pus either from the mastoid or from the neck. It certainly was not pus which caused the serious symptoms. When they were at their height the discharge from the ear went on, but gradually diminished. And when the patient was fairly convalescent, and up and about the old swelling and redness of the neck reappeared for several hours. Besides it should be noted that no chill occurred during the progress of the case. This fact together with the clearness of the patient's in-



tellect, gave me great encouragement when I was struggling against the opinion of a valued colleague who thought the patient was dying for want of an operation. Dr. S. was relieved after large doses of quinine at a time when the pain was intense, and when these seemed to fail, he was permanently cured after the full doses of alcohol advised by Dr. Loomis.

I believe that I was the first in this country to formulate the symptoms which should lead to the prompt performance of Wilde's incision, and trephining the mastoid process. As bearing upon this discussion, I venture to reproduce these formulæ here.

\* I.—The integument and periosteum should be freely divided over the mastoid in all cases in which there is pain, tenderness and swelling in the part.

II.—Such an incision should also be made whenever severe pain, referred to the middle ear, exists, and is not relieved by the usual means, *i.e.* leeches, warm water, etc.

III.—An explorative incision should be made when we have good reason to suspect the existence of caries and retained pus in this part.

IV.—The mastoid bone should be perforated after such an incision whenever the bone is found diseased, or a small fistulous opening should be enlarged. It should also be perforated when we have good reason to believe, that there is pus in the middle ear or mastoid cells which cannot find an exit by the external auditory canal.

I omit the fifth rule as it has no bearing upon this case.

As is well known, it is very difficult to formulate rules for operation which shall cover all cases. All rules must yield to peculiar circumstances. Still I think my first formula might be a little more guarded. I would now write "the integument, and periosteum should be freely divided over the mastoid, where there is pain, *chiefly referred* to this region as well as tenderness and swelling." When the Wilde's incision was made in this case upon my advice the pain was not "chiefly referred" to this part. But there was no particular tenderness, simply a very

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\* Treatise on the ear.—Roosa. Page 424.



slight œdema which might have been due to the applications that had been made, so that according to the rule without altering it, the incision need hardly have been made in this case. The second formula, however, justified the incision fairly, and this, I think, should be modified. I would now write, instead of the second, "such an incision should usually be made whenever severe pain referred to the middle ear *constantly* exists, which is not even temporarily relieved by the use of leeches, warm water, morphia, quinine, etc." In the case we have been studying, the pain was referred to many parts besides the middle ear, and it was relieved for hours at a time by morphia, quinia and alcohol. I would not modify the third and fourth formulæ, for I still think that the bone "should be perforated when we have good reason to believe that there is pus in the middle ear or mastoid cells, which cannot find an exit by the external auditory canal." Everything turns upon the "good reason to believe," and I did not advocate, indeed I could not consent to opening the mastoid, because I did not think that we had "good reason to believe" that pus was retained in this part. I am in full accord with the great English surgeon, Sir James Paget, who, in his admirable lectures expresses many times his hesitation to perform any surgical operation, however trivial, that is not absolutely required. We have no right I think to perform operations to clear up doubtful diagnoses, if, in case the operation proves to have been unnecessary, the patient will be decidedly the worse for it. If we put ourselves in the place of our patients, what we may regard as a trifling thing, "a mere cut," will not be so esteemed. A mere cut, when unnecessary, may have the most serious consequences, and all the history and symptoms should be carefully weighed before even that is undertaken. Such care will never prevent prompt, rapid and thorough surgical interference when demanded.

In teaching medical students, I have always found them when fully awakened to the dangers of *neglecting* certain diseases, to be more apt to do too much than too little, especially with the knife and active drugs. It is possible

also, that the crying ignorance and neglect of the previous decades in regard to the treatment of aural disease has had a tendency to cause us who see many of the affections of the ear, to lean towards the side of surgical operations upon the drumhead and mastoid, a leaning no less dangerous to the cure of some cases, than was the steering towards Scylla or Charybdis to the safe navigation of ancient mariners.

# THE HISTOLOGY OF THE INFERIOR TURBINATED BONES, AND OF THE TELEANGIECTATIC FIBROMATA ARISING FROM THEM.

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Translated by Dr. RICHARD C. BRANDEIS, New York.

*(With Plates I and II.)*

H. G., aged 17 years, female, presented herself at the clinique of Prof. Moos, on August 1, 1878, for treatment of a bilateral catarrh of the middle ear. In examining the nose, a large tumor, broad based, and about the size of a hazel-nut, was seen, situated on the anterior third of the inferior turbinated bone of both nasal cavities. The one on the left side projected towards the septum, and almost entirely occluded the entrance to the nasal cavity, so that it was impossible to apply the nasal douche. As the patient had not previously been aware of the existence of the tumors, nor of the fact that she had any nasal trouble, she could give no information about their origin or duration. The patient was robust, but short in stature, not anæmic; her neck deformed by a diffuse goitre, and although she was, at the time of writing, 18 years of age, the menses had not yet put in their appearance. The condition of the heart was normal. Her general health, good, and with the exception of her deafness, there was no cause for complaint. On August 6th the left, and on October 9th the right tumor was removed by means of the galvano-caustic wire. The hemorrhage was trifling during both operations. The patient was very irregular in her attendance at the clinique for after treatment. On the 14th and 21st of November a few small granulations, located on the left inferior turbinated bone, were destroyed by means of the galvano-cautery, and on the 2d and 7th, of January, this year, the same thing was done on the right side. These proliferations were situated on the seats of the tumors, which had previously been removed, and were, therefore, thought to be recur-

rent growths. Since that time the inferior turbinated bones have been quite healthy in appearance, although the mucous membrane lining the middle turbinated bones and the rest of the nasal cavity has been hyperæmic throughout.

The tumors were ovoid in shape, of a fungous nature, and very dense in consistency. The surface, which was nearest to the septum, was covered with grooves and crypts. The surface of the left tumor, which was in apposition with the septum narium, was uneven and ragged, owing to the continuous pressure exerted upon it. Small fragments of bone were entangled in the basis of the tumors, which had been grasped and detached by the galvano-caustic wire; thus a favorable opportunity was afforded for examining these neoplasms in connection with their entire matrix.

As the examination, by means of the microscope, revealed a few peculiarities, I deemed it desirable to subject the normal conditions of the tissues of the turbinated bones to a careful investigation before proceeding with the former.

An inferior turbinated bone, which was not injected, was cut off close to the crista turbinalis, immersed for a few days in a one per cent. solution of chromic acid and, after the bone was fit for dissection, hardened in alcohol; then embedded in liver. The entire mass was divided into 344 frontal sections, so that, taking into account a few useless ones, and such which were used for special examinations of the tissues, estimating the length of the turbinated bone at about 6 *cm.*, there was an average of six sections to the millimetre. Thus the distance of the preparations from either the anterior or posterior end of the bones could be accurately determined. These were colored with pilocarpin, and then enclosed, in the usual manner, in Canada balsam. Before proceeding with a description of the growths, I take the liberty of adducing a few histological points, which, I think, are not generally known.

In proceeding in the manner mentioned above, we secure some very satisfactory demonstrations, especially of the sections of the bone which is composed of a spongy substance, whose varied arrangement in its different parts precludes any detailed description. I will only add that, at a distance of from 22–24 *mm.* from its anterior end, the bone

is divided into an upper and a lower half, which two parts are but partially united by a narrow strip of periosteum. This condition was also found about the middle of the bone, but at this point the appearance of parts may vary in different cases.

Large, bright interspaces (Fig. 1) are seen in the fine bony trabecular substance, which are filled with fibrous tissue containing pale lymphoid cells. In this fibrous tissue we generally find transverse sections of delicate vessels; longitudinal sections being but seldom found, which, according to this, and like the veins in spongy tissue, commonly course in a sagittal direction. The walls of the vessels are apparently composed only of the fibrous tissue, which is here more closely aggregated than elsewhere, in consequence of which the edges of the cut vessels are more deeply tinged with the carmine coloring-matter than the surrounding tissues. Traces of an undoubted endothelial lining were only visible in isolated spots. This is probably owing to the fact that the head, from which the turbinated bone was taken, had been immersed in alcohol for a length of time,

The diameter of the vessels varied from 0.033 to 0.22 *mm.* In order to reach the outer surface, they either perforate the bone or lie in recesses separated from the soft parts only by the periosteum. In the middle three-fifths of the turbinated bone, where the osseous structure contains the largest cavities, we find, in the vicinity of the vessels, large, round and polygonal, fatty, glistening cells analogous to the marrow-cells generally met with in the cancellous portion of bone.

Voltonini \* was the first to call attention to this beautiful vascular development, and has described it in an excellent manner. For reasons which I will explain hereafter, and which are based upon microscopic appearances in the tumor before us, I must account for the vessels otherwise. Voltonini considers them blood-vessels, whereas I, with the exception of a central artery which will be described later on, have seen but a few vessels coursing in the bone; and am

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\* Address delivered December 15, 1876, before the Silesian Association for National Culture.

more inclined to consider the most of them as lymphatics. An attempt to discover a connection with the blood-vessels was not successful, but many of them terminated in a bright and sometimes fissure-like space, which the periosteum made it possible to recognize in close vicinity of the bone (Fig. 1, b). In connection with these there were fissures in the soft parts, especially in the vicinity of the veins, which extended into the glandular structure and the connective tissue surrounding it. The fact that these fissures were found in every specimen, and were particularly well marked in neoplasms, led to the inference that they were not incidental to faulty preparation, but were nothing more or less than lymph fissures and nutritive canals, whose contents were taken up and carried on by the vessels of the spongy bone.

The great vascularity of the turbinated bones makes it certain that a considerable current of serous fluid passes through the walls of the blood-vessels and permeates the surrounding tissues. The canals spoken of, protected as they are by the bony structure from compression by the erectile tissue, are well adapted to conduce to a free passage of these fluids into the neighboring lymphatics, which lead to the deep facial glands. Another fact, which goes to prove that they were not blood-vessels, was the delicacy of their coats, which could not well withstand the cardiac pressure. Furthermore, the vessels found in the bone, which was enclosed in the tumors, were somewhat dilated, and, in spite of the fact that they had been severed by the galvano-caustic wire, quite empty; whereas the vessels in the neighborhood were full of blood-corpuscles, while the fragment of bone was surrounded by a considerable extravasation of blood (Fig. 2, b, e). Nevertheless, further examinations of well injected human turbinated bones will be necessary, in order to determine this point satisfactorily. A specimen taken from a calf failed to throw any light on the subject.

As far as the erectile tissue is concerned, it is well known that the most numerous venous spaces are found at the posterior extremity of the turbinated bones. A few of these are prolonged throughout the continuity of the bone, on



the lateral as well as the medial side, to appear more frequently on the anterior extremity, without, however again regaining either the number or size which they possessed at their origin. When they are less numerous, the space remaining is almost entirely occupied by large mucous glands, as depicted in Fig. 1, which is copied from a frontal section, situated about 18 *mm.* from the anterior extremity.

The venous spaces are characterized by the formation of longitudinal processes, which project into their walls. This I first considered a pathological development in the tumors, but have invariably found it in all normal preparations. The vascular cavities thereby assume the most varied shapes; instead of a round vein we find them kidney- or crescent-shaped; sometimes even triangular or polygonal and occasionally even stellate. Under the microscope the processes of the veins, which were cut through, assumed a club-like form, or sometimes even looked like a button or mushroom. Occasionally they only projected from one side, but *in other cases they anastomosed from different sides of the cavity.* It is presumable that these protuberances, in connection with the frequent angular shape of the vessels, are able to occlude them more efficiently, in case of a contraction of the tissues surrounding the walls of the veins, than would be possible if the vessels had retained their ordinary circular form. The lymph fissures mentioned above extended into the clubbed and cone-shaped excrescences. Although the minor surface of the veins was lined by an endothelium composed of minute cells, its outer coating consisted of a dense network, 0.02 to 0.1 *mm.* in thickness, in which elastic fibres predominated. These generally extended vertically along the calibre of the vessels, and when tinged with carmine assumed a dark color very similar to that of the periosteum. In some specimens I thought I recognized transverse sections of unstriped muscular fibres, but failed to see them in teased preparations which had been saturated in a twenty per cent. solution of nitric acid. On the other hand, in these specimens, broad and narrow elastic bands came plainly into view, which proved to be composed of

single fibrillæ, and were situated between the well-known spiral-shaped fibres.

It is well known that only a few arteries, branches of the posterior nasal artery, traverse the turbinated bones. In the majority of the specimens I could only discover three or four arterial sections, whose innermost coating always appeared to be closely folded. An artery courses through the middle third of the bone, within the bony canal described by Luschka, and is, in some places, changed into an open furrow, inasmuch as its bony walls are sometimes deficient on the medial and at other times on the lateral side, and then only covered by the periosteum instead. The other soft parts of the turbinated bone, as well as a few glands, also pass through this canal, all enveloped by the layer of periosteum.

The glands of the respiratory part of the nasal fossæ (Fig. 1, d) are generally considered acinous. Nevertheless they are not really composed of vesicles, as many specimens would lead one to suppose, but assume the form of many of those muciparous glands which Kölliker \* has mentioned in his description of the glands of the mouth. They are, consequently, composed of very tortuous tubules, provided with many sinuses and oblong buds, and lined on their inner surface with low cylindrical epithelium. Owing to their numerous convolutions they sometimes assume a circular, and at others an oval or tubular shape in the microscopic section. Perhaps B. Fränkel † alludes to a similar appearance in saying, that "the nasal mucous membrane proper (in contradistinction to that of the olfactory part), contains more highly developed glands nearly allied to the acinous type." The longitudinal diameter of these groups of glands sometimes reaches 1 mm.

In the anterior two-thirds of the turbinated bones, the mucous membrane is only a delicate, slightly corrugated covering of the remaining soft parts, while at the posterior end the folds are so thick that transverse sections have cornice-like projections and indentations. These are evi-

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\* Histology, 4th ed., pag. 352.

† Ziemssen's Cyclopedia of Path. and Therap., vol. iv, pag. 112, Germ. ed.

dently only present for the purpose of increasing the surface of the mucous membrane whenever a considerable congestion makes it necessary.

The periosteum and mucous membrane are united by a fibrous network which passes through the glands and vessels. The dark color it assumes when died with carmine, in contradistinction to the pale yellow hue of the connective tissue, as well as its wealth of elastic fibres, justifies the supposition that it is more nearly allied to periosteum than to mucous membrane.

In accordance with this Kohlrausch \* describes the erectile tissue as lying partly in the periosteum and partly in the mucous membrane, whereas other authors say that it is limited to the mucous membrane alone. It would be more correct to consider glands and erectile tissue apart from the mucous membrane, and to describe them as between the periosteum and mucous membrane, as they constitute the greater part of the soft tissues (Lusckha, B. Fränkel).

There are no differences of opinion about the epithelium. All authors agree in describing it as of the ciliated variety, and for that reason I have not deemed it necessary to illustrate it by drawings.

The tumors were also placed in a 1 per cent. solution of chromic acid until the fragments of bone contained in them had become softened. They were then divided into sections, which were colored with a solution of picro-carmine. The main features were so much alike that the following description will answer for both: The greater part was composed of the anatomical tissues proper to the turbinated bones, which, however, had undergone some changes. With the exception of a small excavation on the inferior surface, into which there was a proliferation of tissue (Fig 2, between k and l), the bone was quite normal in structure. Some of the lymphatics in the lacunæ were dilated; the fibrous tissue which filled these lacunæ was denser and more marked. The veins, especially those running in a medial direction and below the bone, were considerably dilated and filled with blood; their walls were thinner, and the excrescence

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\* J. Müller's Archives, 1853, pag. 149.

projected into the calibre of the vessels in the form of narrow strips. The lymphatics contained in the latter, as well as those in the partitions separating the different veins, were very noticeable (Fig. 2, l). There was also a decided atrophy of the glands, their diameters lessened, and separated by a dense infiltration, containing numerous small cells within its interstitial tissue. They were sometimes so diminished in size that only traces of them could be found (Fig. 2, v d). The number of the glands, more particularly in the left tumor, was decidedly less than in normal tissue, so that a destruction of entire groups of glands could be proven. At some points only traces or remnants of the glands could be discovered, while the excretory ducts were intact, and sometimes even dilated. At some distance from the bone, veins, surrounded with thickened walls, but not themselves dilated, were found. At the periphery of the tumor, in transverse as well as longitudinal directions, numerous newly-formed vessels were seen, all filled with blood and nearly reaching the periphery. In the outer zone there was an infiltration of small cells lying within a delicate fibrous tissue, and the interspaces of the vessels in the other parts of the tumor were filled by a stroma of closely aggregated connective tissue, in which the cellular contents were visible only in the thinner sections. A few deep fissures (Fig. 2, sp) extended into the neoplasm from the periphery, and had an epithelial lining composed of thin, spindle-shaped cells several layers in thickness, which also covered the surface of the tumors, where, in some places, it was in active proliferation, and about 0.19 mm. thick.

We had, therefore, to deal with a dilatation of the veins situated near the basis of the tumor, a destruction of the glandular structure, a development of granulation tissue, and the formation of deep fissures.

With the exception of those by Michel and Köster, of which I will speak hereafter, I failed to find any description of the microscopic conditions of similar growths on the anterior portions of the lower turbinated bones. These proliferations are generally classed as inflammatory hyperplasias of the mucous membrane. Virchow,\* in his lecture on mucous

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\* On Tumors, vol. iii, pag. 462.

polypi, with teleangiectatic alterations of the vessels, only speaks of those polypi found in the posterior portion of the nasal cavities, which often contain extremely dilated vessels. He considers it still a mooted point whether or not the vascular naso-pharyngeal polypi may occasionally be connected with the turbinated bones. The case of E. Neumann,\* quoted by him, is also that of a tumor of the naso-pharynx. B. Fränkel,† after describing the mucous polypi, passes on to the sarcomata and fibromata, which generally take their origin in the periosteum, and are not seldom teleangiectatic, and refers to the above quotation from Virchow's works. Michel‡ has removed from the nasal cavities of a number of patients affected with chronic catarrh, a series of small tumors situated on the concave surface of the lower turbinated bones.

He described them as spherical, cylindrical or strawberry-shaped dense sessile nodules. Köster's microscopic description is: "They are, in their deeper layers, angiomatous, and in parts composed of an interstitial tissue made up of small cells. Long and broad tubes, lined with ciliated epithelium, extend into them from the surface. The acini are closely aggregated, and between them are numerous lymph corpuscles. In the substance of the growth the blood-vessels are so greatly dilated that they often appear like cysts. Diagnosis: angiomatous mucous polypi and muco-glandular polypi." This opinion agrees with that advanced by us above, with the exception of the statement that a new development of glandular tissue had taken place.

Nevertheless, opinions may differ whether the above described nodes—to use an indifferent term—are to be considered as inflammatory swellings or as tumors. The first examination apparently revealed a simple teleangiectasis of the erectile tissue, while, at other points, a hyperplasia of the connective tissue, a formation of new vessels and

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\* Virchow's Archiv, vol. xxi, pag. 280.

† Diseases of the Nasal Cavities, Ziemssen Cyclopedia, Germ. ed., vol. iv, pag. 156.

‡ Diseases of the Naso-pharyngeal Cavities, Germ. ed., pag. 106.



a dense infiltration of cells had taken place, changes which might be looked upon as the results of chronic inflammation. The supposed cause of the neoplasm was such, that it might be either an inflammatory proliferation or a tumor. The possibility of there being a disturbance of circulation in the erectile tissue of the turbinated bone, in consequence of the diffuse goitre, was suggested. The pressure exerted on the veins of the neck by the enlarged thyroid gland, might have impeded the current of blood in the facial veins, in the anterior internal maxillary vein as well as the posterior nasal veins, and thereby given rise to a persistent venous stasis in the region of the turbinated bones. If this solution be not satisfactory, the cessation of the menses, which, as is well known, may also cause congestion in other organs, might suffice to explain the hyperæmia of the tissues of the nasal cavities.

In consequence of Cohnheim's investigations, it has become doubtful whether venous stasis or fluxion, even though long continued or often repeated (O. Weber) can give rise to a proliferation of tissue or, as Billroth says, whether "continuous stasis of blood and lymph, as well as coagulation of these fluids in the vessels cause hyperplastic processes in the walls of the vessels and afterwards in their immediate surroundings." But then again, the erectile tissue possesses certain properties not peculiar to ordinary veins, and it may be said that the walls of its vessels, which are permanently dilated, will, sooner or later, undergo changes of nutrition admitting a filtration of the fluid and cellular inflammatory material. The inflammatory condition of the skin in the vicinity of varicose veins, on the lower extremities, is a well-known example. We, therefore, consider ourselves justified in maintaining the correctness of our opinion as to the etiology of the enlargement, although it does not determine whether it be an intumescence or a tumor. It may be well to call attention to two facts which are in favor of a conversion of the inflammatory neoplasia into a tumor, *i.e.*, the atrophy of the glands, and the condition of the epithelium.

The destruction of the glands may be attributed to va-



rious causes. The proliferation of connective tissue may have given rise to cicatricial contraction, and thus have destroyed the glands lying in this region, by compression, in the same way as in the atrophic form of chronic rhinitis, in which the pathological alterations noticed in ozæna have occurred (E. Fränkel\*). The unhindered formation of new vessels, as well as the enlargement of those already in existence, and of some of the excretory ducts of the glands militate against this view. On the other hand, the dilatation and formation of the vessels, and the pressure exerted by them may be considered as a cause of the wasting away of the glands. The development of the placental decidua, in which, at about the fourth month of foetal life, there is an atrophy of the glandular structure, might be cited as a physiological paradigm. After all it is most probable that the cellular infiltration within the glandular interspaces produced the atrophy of the efferent ducts either by pressure or by absorption.

We must now return to Virchow's statement,† that tumors are generally found where permanent disturbances exist in the anatomical structure of the parts, which check the restoration of a healthier condition; keeping up an irritation, which in any other organ would only give rise to an inflammatory condition, but here becomes the starting point of a neoplastic growth. Cicatricial tissue is a good example of this condition of things, for it is well known that this is not infrequently the matrix of certain tumors. It is self-evident that the foregoing process must, in a short time, lead to a disturbance of the physiological equilibrium of the component parts of any organ, in consequence of which the chemical process of nutrition must necessarily be changed. We are, therefore, justified in assuming that, in our case, after the suppression of the function of the glands, the material ordinarily excreted by them was used, either for the further development of the neoplasm, or at least contributed to increase the chronic irritation already existing in the nasal tissues. This irritable

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\* Virchow's Archiv, vol. cxxv.

† Tumors, vol. i, pag. 84.

condition soon extends to the epithelial lining, and here we find the second factor, which conduces to the development of a tumor, *i.e.*, *the condition of the epithelium and the fissures* created by it. The result is, not only a proliferation near the surface, with a gradual exfoliation of the external layers, but what is more important, the chronic state of irritation gives rise, even in benign tumors, to an inversion of the epithelial growth, an expansion into the substance of the tumor itself. This is either in the form of the well-known cones, or, as I think is more frequently the case, the epithelium occupying the surface in large patches works its way into the growth, at first forming septa, and later on, fissures, as has so often been observed in aural and nasal polypi.

Steudener\* was the first to illustrate and describe this condition satisfactorily. He showed that the presence of glands could not be demonstrated when such fissures and grooves were present as soon as similar grooves were found in numerous successive microscopic sections. This author properly says, that heretofore but little attention has been paid to this peculiar condition of the surface of the polypi. He also says that "for this reason such epithelial proliferations can only be classed as glands when proper sections demonstrate them as real tubules which are lined with epithelium."

Based upon these statements, I would like to mention the observation that *parts of polypi are frequently detached by epithelial proliferation*. We then see a solid plaque of epithelium, which in a microscopic section looks like a narrow strip, proliferating towards the centre, and again reaching the periphery either directly or by means of lateral projections, thus encompassing segments of the tumor. The same condition may ensue, inasmuch as another proliferation of epithelium may approach the first from some other part of the tumor, and gradually unite with it. The type of epithelium is not of much moment. The process so well known in the embryonal development of the glands soon sets in; in the middle of this strip the innermost layers of

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\* Archiv. für Ohrenheilkunde, Bd. iv, pag. 205.

cells are separated one from the other, a fissure is formed, and the detachment of portions of the tumor, as described above, is the result. Such are often found on examination of polypi during the preparation of microscopic specimens, inasmuch as club-shaped protruberances become detached while making the sections. Occasionally we may succeed in securing them still in connection with the main portion, and can thus place them upon the microscopic slide. The strangulated portion is then found to be attached to the main portion of the section by a thin layer of epithelium. Fig. 4, representing a fibrous nasal polypus which I removed from the lower turbinated bone of a woman by means of an ecraseur, illustrates such an epithelial separation. The detached portion is here seen to be surrounded by epithelium, and only loosely connected with the main parts of the polypus. In Fig. 3, a section taken from the right nasal tumor, which has been the subject of this description, we can see the fissure so far developed that the portion shown is only attached to the main body by a slender bridge. It is probable that the lobes and nodes found on the surface of many benign tumors are not the result of a simple proliferation of the underlying tissue, in which case the epithelial covering would remain inactive, but are the result of an active and destructive invasion of the latter into the stroma of the growth.

Herewith the question of the return of the epithelial coats to embryonal conditions, their struggle with the formations of the mesoderm (Thiersch \*), (Boll †), which heretofore has been discussed principally in connection with the investigations of malignant growths, will also apply to growths of a more benign character. We cannot, however, deny the fact, that the most recent embryological investigations do not seem to corroborate these deductions. If it should be proven that the mesoblast arises from the epiblast (Kölliker), that epithelium as well as connective tissue may be either of the three blastodermic membranes, the independence as well as the struggle of one system with another

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\* Epithelial cancer, especially that affecting the skin. Leipzig, 1865.

† The law of growth. Berlin, 1876.

would again be an object for future investigation. Nevertheless, the observation of many pathological conditions seems to favor such contradistinctions, the true explanation of which will require further investigations.

Returning to the neoplasms under discussion, I must date the transition of the products of chronic inflammation into the development of tumors from that moment at which the condition of irritation (after a suspension of the physiological equilibrium by destruction of some component parts) was extended to the epithelial layer, and stimulated this to perverted action. Considering the tumors as teleangiectatic fibromata would correspond to the nature of their structure.

Prof. Moos, having kindly placed the material for these investigations at my disposal, is entitled to my heartfelt thanks.

#### DESCRIPTION OF THE ILLUSTRATIONS.

FIG. 1.—Hartnack, Syst. 2. Eyepiece, 3. Tub., O. Frontal section through bone and soft part of inferior turbinated bone, 18 mm. from anterior extremity.

*a.* Lacunæ in the bone, containing the lumina of the lymphatics (*l*).

*b.* Clear space between periosteum and bone. At *b* there is the terminus of a lymph-vessel.

*k.* Sinus in the bone.

*at.* Section of arteries.

*v.* Veins.

FIG. 2. Hartn., Syst. 2. Eyepiece, 3. Tub., O. Transverse section through the left tumor. In the section of bone whose apex extends to *ke.*, we find the same anatomical relations as in Fig. 1, but here the lymphatics are sometimes larger. Lower down there appear the cross-sections of numerous venous cavities, greatly dilated and filled with blood corpuscles.

*ls.* Lymph-fissure within the sinus of a vein.

*vd.* Atrophied glands.

*sp.* A fissure.

*b. e.* An extravasation of blood.

FIG. 3.—Hartn., Syst., 4. Eyepiece, 3. Tub., O. A portion of the right growth containing a fissure (*sp*) due to a sinuosity of the epithelium.

FIG. 4.—Hartn., Syst., 4. Eyepiece, 3. Tub., O. Transverse section through a portion of a lobulated nasal polypus, with a complete separation of a portion of the growth owing to epithelial proliferation.

ABSTRACT OF AMERICAN OTOLOGICAL  
LITERATURE FOR THE SECOND  
QUARTER OF 1879.

BY SWAN M. BURNETT, WASHINGTON, D. C.

1. *A case of ear-cough. By W. S. Bowen, M.D. Boston Med. and Surg. Jour., June 19th.*

A girl of 8 years had been subject to a dry, and at times very distressing cough, for nearly two years and a half. For some reason, which the author does not state, the ears were examined and the right ext. meatus was found filled with inspissated cerumen. This was removed and a large jet bead found in the interior of the mass. There was some ulceration of the dermis near the *M. T.* In ten days the cough had entirely disappeared. The reflex action took place through a branch of the auriculo-temporal branch of the fifth pair, the connection with the other nerves being made at the floor of the fourth ventricle.

2. *The importance of treatment of the naso-pharyngeal space, tonsils and uvula, in acute and chronic catarrh of the middle ear. By Lawrence Turnbull, M.D. Rich. and Louisv. Med. Journ., April.*

Dr. T. first explains the best methods of examining the parts in question and then proceeds to the consideration of acute catarrh. His treatment consists in determining, as much as possible, to the skin and keeping the patient in-doors. As an agreeable snuff in acute and subacute nasal catarrh, he uses : morph. hydrochlor. gr. ij ; acac. pulv. 3 ij ; bismuth. subnit. 3 vi. A pinch to be used every six or twelve hours.

In the chronic form of nasal catarrh the most important matter is the removal of scabs and the irritating secretions. To accomplish this he uses warm solution of chloride of sodium, potassium



or ammonium, thrown up the nose by means of an atomizer. No mention is made *pro* or *con* of the nasal douche. If the parts are dry, he uses the following solution warmed: Ammon. chlor. gr. iv-xij; aq. dist.  $\frac{3}{4}$  i.

Internally, he has found cubebs of value, in doses of fifteen or twenty drops of the oleo-resin on sugar three times a day.

In acute tonsillitis, he applies nitrate of silver in substance followed by a gargle of chlorate of potash, or by the spray of a warm solution of twenty grs. of sulphate of copper to the ounce of water, with ten drops of carbolic acid added. If an abscess seems inevitable he punctures and thus cuts short the process. In the enlarged tonsils of children he rarely abscesses, finding scarification and the application of absorbents usually sufficient, but in adults, (after 16 yrs.) he always removes a portion of the indurated gland before making local applications. Five cases in illustration are given.

3. Dr. W. W. Seely in some clinical remarks in *The Cincinnati Lancet and Clinic*, June 14th, said that so far as he knew, nothing applied to the ear afforded greater relief than a *poultice*, and in *acute otitis media purulenta*, heterodoxical as it might appear, he did not hesitate to use it now and then. In the same lecture he states that for the last decade he has used exclusively the application of chromic acid to all forms of *aural polypi*, with the most gratifying results. He has also ceased using *the syringe* in *otorrhæas*. He cleanses the ears with cotton wrapped around a No. 3 or 4 Bowman probe.

4. *Medication of the middle ear through the Eustachian tube, without the use of the Eustachian catheter—Etherial solutions.* Dr. Luis F. Sass. *N. Y. Medical Record*, April 5th.

At a meeting of the surgical section of the N. Y. Academy of Medicine, Dr. Sass exhibited an improved steam-atomizer, and described his method of medicating the middle ear without the use of the catheter. This is as follows: He fills one nostril with a bulb, to which the spray tube is attached; the other is closed by the thumb of the operator. The patient is then directed to fill the lungs and close his mouth. The spray will then enter the middle ear, and be seen to come out if there is a perforation. He has used the vapor of etherial solutions of iodoform and carbolic acid with satisfactory results. In some cases he has blown pus into the external meatus, after he had perforated the *M. T.* by means of this procedure.

5. *The limit of perception of musical tones by the human ear.* Laurence Turnbull, M.D. *Boston Med. and Surg. Journ.* May 29th.

Dr. T. employed in his experiments König's rods, and found among twenty-five persons, from 20 to 50 years of age, the highest limit to be 60,000 vs. There was often a marked difference in the two ears, generally in favor of the left. A young man of 26, however, went as high as 60,000 in his right, could only reach 55,000 in his left. Dr. T. thinks he finds a gradual shortening in the range of audition with age. He is also of the opinion that the education of the ear has much influence on the acuteness of hearing, and that by practice one can learn to distinguish tones that were before inaudible.

6. *Pathology of peripheral nerve-disease, by Julius Althaus, M.D.* *Amer. Journ. Med. Sci., April.*

Dr. Althaus devotes the second section of his admirable article to the consideration of *auditory neuritis*. He thinks it advisable to restrict the term "Ménière's disease" to those cases where there is evidently hemorrhage into the labyrinth, since most of the cases reported by the distinguished French artist were undoubtedly of that character. But there is another set of cases where the trouble is sudden in its onset, not very severe in character, and transitory. These he considers due to hyperæmia of the labyrinthine vessels. He also believes, firmly, in an idiopathic inflammation of the labyrinth, and that the inflammatory process may be propagated to the labyrinth from the brain and middle ear; and thinks that such labyrinthine inflammation is frequently confounded with congestion or inflammation of the brain, or even with severe attacks of dyspepsia and congestion of the liver; and is much more common than it is usually thought to be. He then gives the history in minute detail of a case of what he considers to be labyrinthine neuritis in a case of locomotor ataxia under his care. The history in brief is as follows: A man of 32, previously of good health, had gastric troubles for some time, which were followed after some months by slight paralysis of some of the ocular muscles, and which disappeared in a few days. Shortly afterward there was vertigo, tinnitus and nausea, but no loss of consciousness. Gradually his hearing power left him, and he was completely deaf, not being able to hear the loudest sounds; no bone conduction. Some reaction to the electric current on the

part of the auditory nerve. External and middle ear perfectly normal. No dyscrasia of any kind. The usual symptoms of locomotor ataxia. Upper extremities not affected. One day the patient was taken suddenly with vertigo, followed by coma, and for two days there was an elevation of temperature, coated tongue and tenderness in the right hypochondrium. This passed off in a few days, and from that time on he steadily improved, and was finally discharged able to walk three or four miles and attend to his business. The deafness and tinnitus, however, remained as before. Before the last attack the treatment was nitrate of silver, hypophosphite of soda and podophyllin, and afterwards it was liquid ext. of ergot in half drachm doses three times a day, pushed to one drachm. After three months this was changed to citrate of iron and quinia. Dr. Althaus looks upon this case as one of acute inflammation of the labyrinth. The lesion could not have been at the cerebral centre of audition, because, in that case other nerves, notably the fifth pair, would have been implicated; the auditory nerve itself was not affected, as he judges by the fact of its responding to electorial irritation; it must, therefore, have been *per exclusionem* in the labyrinth. The second attack of vertigo and nausea he considers as due to a hemorrhage into the labyrinth.

## REPORT ON THE PROGRESS OF OTOTOLOGY.

IN THE FIRST HALF OF THE YEAR, 1878.

### IV. PATHOLOGY AND THERAPEUTICS OF THE ORGAN OF HEARING.

By A. HARTMANN, OF BERLIN.

Translated by ISIDOR FURST, of New York.

#### *General.*

1. Statistische Uebersicht über die vom 1. Nov. 1874 bis 1. Nov. 1877 in der Berliner Universitätspoliklinik für Ohrenkranke untersuchten und behandelten Kranken, nebst Bemerkungen zur practischen Ohrenheilkunde. [Statistical Review of the Patients examined and treated at the Policlinic for Ear Patients of the University of Berlin, from November 1, 1874, to November 1, 1877; with Remarks on Practical Otology.] By PROF. A. LUCAE. *Arch. f. Ohrenheilkde*, Bd. xiv., p. 120.
2. Dritter Bericht aus der Privatheilanstalt f. Augen-und Ohrenkranke in München. [Third Report of the Private Ophthalmic and Aural Institute at Munich.] By DR. BEZOLD. *Münch. Aerztl. Intelligenzbl.*, Nos. 44 et seq., 1878.
3. VII. Anno di Insegnamento della Otojatria. [Seventh Year of Instruction in Otology.—Statistical and Clinical Observations on the Scholastic Year 1877-78.] By PROF. E. DE ROSSI. Rome, 1878.
4. L'otologie dans les dix dernières années. [Otology in the last Ten Years.] Continuation. By DR. GUERDER (Longwy). *Annales des mal. de l'oreille*, etc., tome iv, No. 6.
5. De l'influence du tabac, etc. [On the Influence of Tobacco on the Development of Diseases of the Ear and Impairment of Hearing.] By DR. LADREIT DE LACHARRIÈRE. *Ibid.*, tome iv, No. 4.
6. Zur Casuistik der traumatischen Erkrankungen des Gehör-

organs. [Clinical Contribution to the Traumatic Affections of the Organ of Hearing.] By F. TRAUTMANN. *Arch. f. Ohrenhklde.*, Bd. xiv, p. 113.

7. Noises in the Head ; their Etiology, Diagnosis, and Treatment. (Continuation and Conclusion.) By E. WOAKES. *The Lancet*, July and September, 1878.

8. Zur Otalgia intermittens. By R. VOLTOLINI, *Monatsschr. f. Ohrenhklde.*, etc., No. 7, 1878.

9. Vortrag über einen Beleuchtungsapparat des Kehlkopfes und der Gehörorgane und zu den daselbst auszuführenden Operationen. [Lecture on an Illuminating Apparatus for the Examination of the Nose, the Naso-pharyngeal Cavity, Larynx, and the Organs of Hearing ; and for the Operations to be Performed thereon.] By DR. SCHALLE, of Hamburg. *Naturforschervers.* Kassel.

10. Day-Schools for the Deaf and Dumb. *Brit. Med. Journ.*, September 14, 1878.

1. Since the opening of the polyclinic for ear-diseases at the University of Berlin, 2,388 patients came under observation, with 2,566 different forms of disease : affections of the external ear, 477 ; of the middle ear, 1,949 ; of the inner ear, respectively nervous deafness, 140. To the statistical compilation are attached remarks on the manner of conducting the examinations which are referred to in the report on physiology (see last number).

Of special cases are mentioned : three of aspergillus in the external auditory meatus ; a case of bilateral congenital occlusion of the ear, with accompanying caries of the petrous bone. Among the latter, the fatal termination in one patient occurred by thrombosis of the sinus ; there was no autopsy. In a child, a previously existing facial paralysis disappeared after scraping out the mastoid process with the spoon. Six months later, a sequestrum of considerable extent was removed.

Of particular interest is a case of epithelial carcinoma developing after repeated removal of polypi. By an operation performed by Bardeleben, exsection of a swelling the size of a cherry, temporary relief was obtained. Three months later, ulcerating swellings had formed in the neighborhood of the ear. Hectic fever, violent pains. Death nine months after first presentation.

In pulsating subjective noises in the ear, Lucae had excellent results with hydrobromic acid (15 to 20 drops in concentrated sugar-water, three times daily). Condensation of the air in the ex-

ternal auditory meatus was applied besides, with temporary benefit. Finally, a case observed by Dennert is communicated : after a cold drink, there was an attack of convulsions with succeeding disturbance of hearing and speech. Cure after exhibition of potassium bromide and the constant current.

2. Bezold's report, extending over a period of three years, contains, besides the statistical classification of 1,021 cases of disease, the discussion of some affections. The scarlatinous otorrhœas of children were cured, when early brought under treatment, by cleaning with salt-water and Politzer's experiment. Otomycosis came under observation thirteen times ; including his earlier cases, the author has treated the affection thirty times ; in fourteen of these cases, the fungus-formation occurred entirely without any symptoms ; in four cases, a reactive inflammation followed the removal of the fungus masses from the auditory meatus. Perforation of the membrana tympani was present six times. As cause of the fungus-formation the author considers instillations of oil which had taken place in twenty-four cases out of twenty-seven. Four deaths were caused by chronic otitis media purulenta ; in two, destructive osseous processes in the temporal bone were demonstrated during life, while in the other two cases polypoid proliferations only had shown themselves in the depths of the external auditory meatus. The possibility existing in cases 3 and 4, of prolonging life by an operation, is not discussed by Bezold. Of particular interest is another case of cerebro-spinal meningitis. The patient in question during the disease could no longer hear words pronounced with very loud voice, but perceived a tuning-fork placed on the vertex. Objective examination normal. The almost complete deafness was accompanied by strong tinnitus, vertigo and giddiness which improved but slowly. Perception of the scale of the piano limited to first g sharp or g above the staff ; faradization (negative pole in the meatus filled with water) caused improvement of hearing after a few applications.

3. In the year reported upon, 367 patients came under treatment—201 males, 101 females, and 65 children. Affections of the external ear (diseases of the membrana tympani are counted among those of the middle ear), 63. Chronic eczema of the external ear was treated, according to Hebra's direction, with solution of caustic potassa, and cure obtained in comparatively short time.

De Rossi justly discards the designation, catarrhal inflammation of the external auditory meatus, and he distinguishes only a dif-



fuse and a circumscribed dermatitis. In the acute diffuse form, the best results were obtained from instillations of alcohol. A cicatricial occlusion of the external meatus could be removed only by incision, succeeded by laminaria treatment. Of affections of the middle ear, 267 came under treatment. In acute meningitis De Rossi tried warm ear-baths; cure followed more slowly than after myringotomy. In acute purulent otitis media, treatment consisted of extensive division of the membrana tympani, which was followed by rapid improvement. In chronic purulent inflammation of the middle ear, De Rossi applied, besides concentrated solutions of silver nitrate, astringent solutions of lead acetate and potassium bichromate. Eleven cases of caries and necrosis of the mastoid process came under treatment, and De Rossi recommends early opening of the mastoid process. The number of cases affecting the inner ear amounted to 25.

4. In continuation to the preceding reports on otology during the last ten years, Guerder discusses the pathology, and commences with the affections of the external ear, which receive a detailed and exhaustive treatment. A special chapter is devoted to the affections of the ear caused by general disease. In the chapter on affections of the tympanic cavity, the difficulty of classification is dwelt upon, and attention is called to the rarity of isolated forms of inflammation, mixed types being more general. Regarding the nomenclature of the sclerosed and hypertrophic forms, Guerder not unjustly maintains that these designations should be retained until scientific progress will furnish us more accurate titles. Concerning the details of the excellent, purely objective description of the author, showing his familiarity with the literature, particularly the German, we must refer to the original.

5. Ladreit de Lacharrière,\* in his introduction, emphasizes how little smoking is considered as an etiological factor in impair-

\* We beg to refer to the treatise of Triquet on tobacco and the ear, published as early as 1863, of which Ladreit's declarations largely remind us. (*Comp. Journ. of Med. and Surgery*, May 13, 1863. The original was not accessible to me, according to my notes). Triquet described a peculiar form of otitis and deafness consequent on excessive indulgence in tobacco and alcohol. Triquet gives the same symptomatology, likewise divided into three stages: 1st, irritation; 2d, depression; 3d, paralysis. Besides, Triquet found simultaneous congestive amblyopia and vascularization of the retina and optic papilla; sense of smell more or less blunted, occasional reduction of mental activity, and tremulousness. Therapeutics: Aside from abstinence, in the first stage, cupping and leeching; in the second, vapors of ammonia sulphate and application of veratria ointment; in the third, with very unfavorable prognosis, palliative treatment.—Moos.

ed hearing, and attempts to prove its effects on the mucous membrane of the naso-pharyngeal cavity and the ear, on the organs in the tympanic cavity, the muscles of the soft palate and pharynx, and the nerves in this region as well as the organ of hearing.

Tobacco smoke, according to the author, contains a large number of fixed substances, easily demonstrated by blowing it through a handkerchief, on which it leaves a brown stain. These constituents of smoke, attaching themselves to the mucous membrane, cause the phenomena to be discussed.

Pharyngeal catarrh of smokers, according to Ladreit, is characterized by the swelling, the injection, the dryness, and the insensibility of the mucous membrane of the soft palate and the pharynx. This condition is distinguished from ordinary catarrh by the dark-red appearance of the mucous membrane; its relaxation without the formation of granulations, and the absence of irritability. The patients are unconscious of their affection, until tinnitus and impairment of hearing set in. In the first stage of the affection, there is a slight congestion of the mucous membrane of the tympanic cavity, a somewhat stronger projection of the malleus, and swelling of the mucous membrane of the tube. When long continued, turbidity of the membrana tympani, swelling of the mucous membrane of the tympanum, and diminished mobility of the ossicula, succeed. Ladreit further holds that the affection of the mucous membrane must have an unfavorable influence on the musculature of the soft palate and on the nervous system. The sensory depression is looked upon as the second stage, while the third is said to be characterized by paralysis of the acoustic nerve, with diminution of the former subjective perceptions of hearing. In the first stage, cure may follow the abstinence from tobacco, the histories of two cases being cited in proof. Ladreit's treatment besides consists in astringent gargles, the application of potassium iodide, catheterization and inunction with an iodine ointment on the mastoid process.

6. The first case communicated by Trautmann concerned a patient in whom, after an attack of coughing, there ensued unilateral considerable impairment of hearing, slight pain in the ear, headache, and continuous tinnitus. The examination, instituted one month after the injury, showed three small extravasations of blood in the membrana tympani. Hearing restored.

In another patient of Trautmann's, a double fissure of the membrana tympani, in consequence of a box on the ear, was ob-

served. One of the fissures was behind the manubrium mallei; besides, there was a rupture in the posterior periphery of a cicatrix situated in the anterior lower quadrant.

In the third of the cases reported, the injury was caused by a wagon-pole striking the left parietal bone; unconsciousness, epistaxis, hemorrhage from the left external auditory meatus, which had to be controlled by tamponing. After removal of the plug of lint, which was saturated with bloody serum, two days after the injury, liquor cerebro-spinalis is said to have "decidedly" flowed from the external meatus. Continuous tinnitus, absolute deafness, vertigo towards the affected side, which increased on pressure upon the mastoid process and upon the base of the skull from the nasopharyngeal space. Diagnosis: Fracture of the left petrous bone. Cure, with deafness and subjective noises.

7. In the continuation of Woakes' essay, reviewed in the preceding report, noises of singing or humming character, of longer or shorter duration, are discussed as occurring either alone or in conjunction with the noises previously considered. Woakes holds that these noises, which must likewise be founded on an objective cause, must be referred either to contraction of the external muscles, or to increased circulation of blood in the relaxed and dilated blood-vessels of the tympanic cavity. Both causes may mutually support each other in effecting these noises by an irritation of the muscles produced by the congestion. Such noises, therefore, may be caused by foreign bodies in the external auditory meatus or in the Eustachian tube; in one case by reflex action, in the other by increase of blood-supply to the tympanum, the blood-vessels of which are in connection with those of contiguous regions. The horizontal position of the manubrium mallei is considered as pathognomonic for retraction of the membrana tympani through contraction of the tensor tympani muscle. Rarefaction of the air in the external auditory meatus diminishes the humming. The noises caused by hyperæmia of the tympanum are the most frequent.

Treatment of the noises forms the last section, in which the author's treatment of retraction of the membrana tympani is especially discussed. In place of Siegel's funnel, Woakes uses for the rarefaction of the air in the external meatus an instrument specially devised by him for this purpose, consisting of a syringe by which the air is exhausted from a pear-shaped globe inserted air-tight into the external auditory meatus. The

manipulation of the apparatus does not appear to be any simpler than that of those previously devised for this purpose. No contrivance for measuring the negative pressure employed is attached.

8. Voltolini describes an additional case of otalgia intermittens; besides violent left-sided headache, the entire left ear became painful, not only within, but the auricle likewise. The attacks occurred "every other day, in the morning, almost at a certain hour." Immediate cure by quinia.

9. Schalle employs, instead of his lamp—which on protracted burning heated too strongly and hence proved hardly serviceable—previously described in the *Archiv für Chrenheilkunde*, Bd. x, either gas-light or any of the better petroleum lamps in the market. Owing to the aberration of the non-achromatic lens and the disproportion in size between luminous body and lens, Schalle does not use the image of the flame for illumination, but the brightest circle of dispersion, the lens being approached to the flame up to 4 cm. It is demonstrated by calculation that the best illumination is obtained if the main light-effect is determined to the laryngoscope. In the new apparatus, the attachment of the mirror is improved, and the formerly employed nasal prop is omitted. Repeated experiments proved that the intensity of light obtained by the new apparatus is greater than that of other similar apparatus for illumination.

10. We gather from a notice in the *British Medical Journal* that in various parts of London day-schools for deaf-mutes have been in existence for four years, which are said to have proved successful. Instruction is imparted in the sound-language, and partly in the sign-language. The objection being raised in the report that the parents have to bring their children to school daily, we fail to see its validity, as in Berlin, for instance, children go to school without escort, some coming from a great distance.

#### *External Ear.*

11. Obliteration accidentelle du conduit auditif externe, etc. [Accidental Obliteration of the External Auditory Meatus; the Difficulties encountered in Maintaining the Opening after Operation.] By DR. LADREIT DE LACHARRIÈRE. *Annales des mal. de l'oreille*, etc. Tome iv, No. 3.

12. Du traitement des tumeurs osseuses du conduit auditif. [Treatment of Osseous Tumors of the Auditory Meatus.] By DR. V. BREMER, of Copenhagen. *Ibid.*, Tome iv, No. 6.

13. Case of Ivory Exostosis in both Ears. By G. FIELD. *The Lancet*, July 20, 1878.

14. Contribution à l'étude des tumeurs osseuses, etc. [Contribution to the Study of Osseous Tumors in the External Auditory Meatus.] By DR. DELSTANCHE, fils. Brussels, 1878.

15. Contribution à l'étude clinique de l'otorrhée catarrhale externe. [Contribution to the Clinical Study of Catarrhal Otorrhœa of the External Ear.] By DR. ED. GAMPIETRO, of Naples. *Monatsschr. f. Ohrenheilkde.*, etc., No. 9, 1878.

16. Reflex-Dysphagie. By DR. J. RUFF, of Stuttgart. *Ibid.*, No. 12, 1878.

17. Note sur les variétés du siège des plaques muqueuses, etc. [Note on the different Sites of broad Condylomata, particularly those of the External Auditory Meatus.] By DR. A. DESPRÈS. *Annales des mal. de l'oreille*, etc. Tome iv, No. 6.

18. Ueber eine eigenthümliche Randtrübung am Trommelfell und deren Bedeutung. [On a Peculiar Marginal Turbidity of the Membrana Tympani and its Significance.] By JOS. GRUBER. *Monatsschr. f. Ohrenheilkunde*, etc., No. 9, 1878.

19. Ueber Myringoplastik. Lecture by PROF. BERTHOLD, (Königsberg). Meeting of Physicists at Cassel.

11. In one of Ladreit de Lacharrière's patients, a peri-auricular abscess had opened into the external auditory meatus. At the first presentation, the region of the mastoid process was much swollen and very painful. Eleven days later, entire alleviation of the inflammatory symptoms was proven, but complete deafness had set in. The external auditory meatus was occluded by a thick, red, new-formed tissue. After incision of the exceedingly hard tissue and removal of two flaps formed thereby, a yellowish serous fluid was discharged from within the external meatus. A few days later, renewed occlusion, repetition of the operation, insertion of a laminaria style which, however, was soon again removed by the patient, it causing too violent pain, so that occlusion recurred. The entire cicatricial tissue was now excised, together with the wall of the meatus from which the cicatricial formation had sprung. Insertion of small pieces of sponge, whereby cure was obtained two months after the first operation.

12. Bremer describes a case in which left-sided deafness had existed from childhood, while, right, greatly impaired hearing had only set in a few months ago. Examination showed the left ex-

ternal auditory meatus, at a depth from 10 to 15 *mm.*, completely occluded by a hard tumor springing from the posterior wall. Right, at a depth of 22 *mm.*, an exostosis was found which, springing from the upper posterior wall of the meatus, nearly filled its lumen. The operation of the latter neoplasm was performed with the instrument employed by the Americans for the drilling of teeth (the dental engine), without, however, penetrating with it as far as the tympanic cavity, which was exposed with the chisel. Formation of granulations followed, cure five weeks after the operation, restoration of hearing.

13. Field gives a full report of the operation for ivory exostoses which had developed deeply in both external auditory meatus of a colleague of his. The tumors, originating at the posterior wall of the meatus, left a narrow fissure in front, and during the operation Field endeavored to protect the *membrana tympani* by inserting a curved spatula behind the tumor. In the first operation, right, which, as in the above case, was performed with the dental engine, and occupied one and three-quarter hours, complete perforation was not secured, which was only effected at a repetition of the operation two weeks later. After performance of the operation on the other side, inflammation and perforation of the *membrana tympani* ensued. On both sides, formation of granulations with purulent discharge followed. After the inflammation had subsided, hearing was restored.

14. In Delstanché's very thorough dissertation, the different views regarding the origin and development of osseous new-formations in the external auditory meatus are most exhaustively discussed, and we restrict ourselves to the quotation of the author's concluding remarks :

"Exostoses of the external auditory meatus may develop both before and after the period of ossification of the canal. Most firmly established as causes are : hereditary disposition, independent or traumatic inflammation or irritation of the bone or periosteum of the meatus. The influence of a gouty, rheumatic, or syphilitic diathesis is not demonstrated. Most frequently the tumors originate at the posterior wall of the auditory meatus ; their sensibility differs with their depth in the meatus. The subsequent symptoms are caused by the occlusion of the auditory meatus, in some cases by the simultaneous swelling of the tympanic cavity and the meatus. The treatment must consist in removal of the neoplasms."



Delstanche himself observed twenty-five cases of exostosis in the auditory meatus, two of which appeared favorable for operation. In one of these cases the neoplasm of ivory hardness, which filled the entire auditory meatus, was pierced with a drill of two millimetres' breadth. The inflammatory reaction was trifling, likewise after the succeeding widening of the first opening, also performed with a drill. A further enlargement of the opening was obtained by cauterizations with zinc chloride. Cure.\*

15. The long duration of the chronic muco-purulent discharge from the external auditory meatus, which Gampietro denominates catarrh of the external ear, according to the author, is caused by atrophy of the walls of the external auditory meatus and the condition of the ceruminous glands. During the incipient hypertrophy of the glands, an increased secretion takes place; temporarily a cessation of the secretion ensues through occlusion of the excretory ducts. The occlusion is followed by accumulation of the secretion within the glands, and with their opening a renewed discharge appears. In order to produce destruction of the glands and consequent cure, the author performs scarification of the wall of the meatus, which is said to remove the secretion and to cause permanent suppression of the formation of cerumen.

16. After a short discussion of previous observations on reflex manifestations provoked by foreign bodies in the external auditory meatus, Ruff reports the following case: A lady had suffered for two days from inability to take nourishment, as every attempt at deglutition incited an irresistible inclination to vomit. The patient's statement, that she felt the attending spasm in the neck more on the left side, caused the author to examine the ear. Left, a plug of cerumen was found, which, however, did not completely fill the meatus. Hearing normal. After the removal of the plug the dysphagia disappeared permanently.

17. In the course of six years Deprès had opportunities, in the Hospital de Lourcine, to observe six cases of affection of the ex-

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\* Some time ago Mr. Delstanche, in the *Archiv für Ohrenheilkunde*, asked the German otologists, through Prof. Schwartze, to send him their works, in order that he might make them more accessible to the literature of his country. I complied with this request of my colleague, and, among others, forwarded to him at the time a reprint of an article of mine on Perforation of the Osseous Occlusion of the External Auditory Meatus, the paper having appeared in *Virchow's Archiv*, 1878, Bd. 74. Mr. Delstanche, nevertheless, has not so much as mentioned my case in his monograph. Not until after the publication of his article did Mr. Delstanche ask me to excuse that the citation of my work had been lost in the printing office—a fact which he had overlooked, as his eyesight was impaired at the time!—Moos.

ternal auditory meatus among 1,200 syphilitic patients ; of these one was a soft chancre, and five were broad condylomata. All of the latter were proliferating ; in one case they were in the fundus of the meatus, and extended to the membrana tympani. The ordinary site was the lower wall of the meatus. In one case both meatus were affected. Cauterization, with concentrated zinc chloride solution, several times repeated, sufficed to effect rapid cure. In one case only the treatment lasted over six weeks. Desprès thinks that the affection occurs chiefly in those patients in whom otorrhœa previously existed.

18. After Gruber, some time ago, had called attention to the fact that partial and total relaxation of the membrana tympani may give rise to the formation of folds, he now expresses the view that the folds occurring at the posterior upper margin of the membrana tympani may suffer a transmutation into a condition designated by the author as a sort of marginal opacity of the membrana tympani, in which the sides of the fold are grown together. The importance of these opacities is variable. Should the air-douche prove ineffectual, the single or multiple discission of the opaque part is considered the most practicable.

19. Starting from the experience that patients affected with perforation of the membrana tympani are most benefited by causing the perforations to close, Berthold invented a procedure for effecting such closure. Berthold's procedure, by him termed myringoplasty, consists of the transplantation of a small piece of skin upon the location of the perforation, and causing it to grow fast. Of two cases in which the operation succeeded, and hearing was considerably improved, one is narrated in detail. In order to free the margins of the perforation from epithelium, a small piece of court-plaster was pasted on ; three days later it was again removed by syringing, and the membrana tympani dried. A small piece of skin from the forearm, containing within it all the constituents of the cutis, was now with its raw surface laid upon the margin of the perforation, and the external meatus closed with a plug of cotton-wool. The attached piece of skin became cadaverous in appearance, and shrank. Two weeks later only a punctiform opening at the margin of the old perforation remained. In the further course the upper part of the transplanted piece was removed by syringing. The perforation healed perfectly. The spot remained prominent, of a yellowish-white color.

*Middle and Internal Ear.*

20. Coup de pistolet dans l'oreille. [Pistol-shot wound in the Ear. Extraction of the Bullet.] By DR. TERRILLON. *Annales des mal. de l'oreille*, etc. Tome iv, No. 5.

21. Eine Röhre (Oese) von Hartgummi fünf Jahre in der Paukenhöhle. [An Eyelet of Hard-rubber five Years in the Tympanic Cavity.] By R. VOLTOLINI. *Monatsschr. f. Ohrenheilkunde*, etc., No. 8, 1878.

22. Fremdkörper im Ohre. [Foreign Bodies in the Ear.] Brief Note by Dr. KAATZER, of Visselhörde. *Berl. klin. Wochenschr.*, No. 52, 1876.

23. Wanderung eines von der Mundhöhle in den Pharynx gelangten Hafer-Rispenastes durch die Ohrtrompete, die Paukenhöhle und durch das Trommelfell in den äusseren Gehörgang. [Migration of a Fragment of an Oat-panicle from the buccal Cavity into the Pharynx, through the Eustachian Tube into the Cavity of the Tympanum, and through the Membrana Tympani into the External Auditory Meatus.] By DR. V. URBANTSCHITSCH, of Vienna. *Ibid.*, No. 49, 1878.

24. Zur Physiologie der Tuba Eustachii auf Grund einer Beobachtung von doppelseitigem organischem Verschluss der Rachenmündung derselben. [Contribution to the Physiology of the Eustachian Tube, based on an Observation of bilateral organic Occlusion of their Buccal Openings.] By Dr. H. DENNERT, of Berlin. *Deutsche Zeitschrift f. pract. Medicin*, No. 44, 1878.

25. Contribuzione allo Studio della Medicina operatoria dell'Orecchio. [Contribution to the Study of the Operative Treatment of the Ear, etc.] By PROF. E. DE ROSSI. *Atti dell' Accademia medica di Roma*. Anno iv, Fasc. 1.

26. Beitrag zur operativen Behandlung der Ohreneruierungen. [Contribution to the operative Treatment of Purulent Discharges from the Ear.] Inaug. Dissert. by H. BIRCHER, of Aarau. Berne, 1878.

27. Ein Beitrag zur Lehre von der Trepanation des Proc. mastoideus. [A Contribution to the Study of Trephining the Mastoid Process.] Inaug. Dissert. by M. NEILING, Kiel, 1878.

28. Ueber Cerebralerscheinungen beim chronischen Mittelohrcatarrh. [On Cerebral Symptoms in chronic Catarrh of the Middle Ear.] By DR. C. BLAU, of Berlin. *Deutsche Zeitschrift f. pract. Med.*, No. 28, 1878.

29. Nystagmusartige Augenbewegungen in Folge eines Ohrenleidens. [Nystagmoid Ocular Movements consequent upon an Affection of the Ear.] By PROF. E. PFLÜGER. *Deutsche Zeitschr. f. tract. Med.*, No. 35, 1878.

30. De l'otite et du sulfate de quinine, etc. [On Otitis and Quinia Sulphate in Mental Disturbances and Convulsions of Children caused by Ear Affections.] By DR. ROUCHUT. *Gazette des hôpitaux*, 1878.

31. Nouveau procédé pour faire pénétrer de l'air comprimé, etc. [A new Procedure for causing the Ingress of Compressed Air and Medicated Vapors into the Middle Ear without the Aid of a Catheter.] By DR. LÉVI. *Annales des mal. de l'oreille*, etc. Tome iv, No. 3.

20. Under Terrillon's treatment there came a patient who for four months had carried a pistol-bullet in his left petrous bone. The ball had entered through the mouth of the external auditory meatus, had caused profuse hemorrhage, and in the surrounding parts rather violent inflammation, which rapidly subsided. A fistulous opening, purulent discharge, and complete deafness remained. With the electric bullet-probe the ball was found embedded one centimetre deep in the bone. By means of a special contrivance one could drill a hole into the bullet, without succeeding, however, in removing it this way. An incision was then made in the line of attachment of the auricle, the latter, together with the fistula in the soft parts, bent forward, and the osseous fistula at the anterior surface of the base of the mastoid process exposed. The bullet retained in the bone could be removed by widening the entrance opening by means of the trepan. The depth of the osseous canal, after removal of the bullet, measured 16 mm. Cure.

21. A hard rubber eyelet which Voltolini had inserted into the membrana tympani of a patient, fell into the cavity of the tympanum, and could not be removed. The succeeding painfulness quickly subsided, and the opening in the membrana tympani closed again. Hearing as compared with previous state undiminished. When patient after the lapse of five years again presented himself, the tympanic cavity was opened by a crucial incision, and the eyelet extracted with a delicate hook. It was surrounded by hyaline mucus. The mucous membrane of the tympanic cavity was deeply reddened. No inflammatory reaction set in.

22. Kaatzner's original communication refers to a peasant whose

ear was found filled with maggots. Instrumental removal did not succeed; soap-suds, tobacco smoke, and chloroform likewise proved ineffectual. Kaatzner now tied a slice of Hollandish cheese over the patient's ear. On the next morning the cheese and worms are said to have disappeared.

23. The case communicated by Urbantschitsch concerned a lady patient, æt. 51, who had bitten an ear of oats off the paniculate branch and swallowed the latter. During its migration from the pharynx into the external auditory meatus, the patient first had a scratching and stinging sensation in the region of the roof of the tongue; in the course of the next few days, in the upper pharyngeal space, together with violent pain which, at the end of the third week, was located in the depth of the ear. With this there occurred slight impairment of hearing, painful swelling of the walls of the auditory meatus, developing later into an abscess. Owing to the insufferable pain, there was difficulty in masticating, loss of appetite, fever-paroxysms, repeatedly accompanied by delirium. In the fifth week, after a sensation as if the panicle had placed itself crosswise in the ear, the patient experienced a violent report with subsequent discharge of blood and pus. In the examination now instituted, a perforation of the membrana tympani was demonstrated, but the panicle could not be discovered. A month later, she believed that she distinctly felt the panicle working outward, whereupon it became visible in the external auditory meatus on the same day, and could be removed. The panicle had a length of 3 *cm.*, and, formerly straight, now showed an L-shaped bend. Quick subsidence of the inflammatory symptoms. Healing of the perforation.

24. Dennert observed the following interesting case: In a female patient there existed bilateral occlusion of the pharyngeal opening of the Eustachian tubes in consequence of syphilis, together with extensive destructions in the nasal cavity, affording an unobstructed view from in front into the naso-pharyngeal space. In place of the tubal openings, a smooth white cicatricial tissue was found, and no motion of the soft parts in the naso-pharyngeal space was observable during deglutition.

The atrophied membrana tympani on both sides partially adhered to the wall of the labyrinth; on the left less distinctly, on the right there can be seen, during the act of deglutition, first an evidently negative oscillation (inward) of the membrana tympani, followed by a positive oscillation (outward). For the cure of the

greatly impaired hearing, the membrana tympani on both sides was incised, and D. succeeded in removing a tenacious fluid from the tympanic cavity by means of varied aërial pressure produced with Siegle's funnel, and to obtain a considerable and permanent improvement of hearing. The occurrence of varied aërial pressure in the tympanic cavity during closure of the mouth of the tube, the author explains by alterations of the lumen in the Eustachian tubes.

25. In his lecture, De Rossi gives to his countrymen a full report of the principal operations at present performed on the ear. He begins with the catheterization of the Eustachian tube, then follows paracentesis of the membrana tympani, which is succeeded by the artificial opening of the mastoid process. The latter is very thoroughly discussed, and, based on personal experience, the indications for the operation are laid down, in harmony with the views at present prevailing in regard to the operation. In one case with extensive cerebral symptoms operated on by Rossi, he removed with great difficulty a sequestrum from the petrous bone, after which a large pulsating vessel, doubtless the sinus transversus, was exposed in its depth. Death seven days after the operation. At the autopsy a larger and a smaller abscess were found in the cerebellum.

Then follows a full description of the morbid processes which, through participation of the ossicula, diminish the conduction of sound, and the operative procedures instituted therefore are explained—section of the posterior folds of the membrana tympani, tenotomy of the tensor tympani, myringectomy, mobilization of the stapes after Kessel. A case is narrated in which Rossi succeeded in obtaining greatly improved hearing by loosening the manubrium mallei from the promontorium to which it was united. In another case Rossi undertook, likewise with very great success as to hearing power, in ankylosis of malleus with the incus, to sever the ligaments between stapes and incus.

The interesting remarks of De Rossi, especially those in the last section, are deserving of careful attention, and we regret being unable to report them more fully, owing to the limited extent of our extracts.

26. Bircher, in his dissertation, discusses three cases which offered him the opportunity of performing the artificial opening of the mastoid process. All the cases occurred in adults, in whom, in consequence of purulent otitis media, accumulations of pus and



formation of granulations had taken place in the air spaces of the mastoid process, with softening of the interposed osseous walls. In the first case, a swelling existed behind the ear; on cutting into it, the knife penetrated deeply into the softened bone, and the mastoid process was completely hollowed out with the sharp spoon. In the second case an abscess had formed behind the ear; after incision, a spot denuded of periosteum was scraped out with the sharp spoon. Three weeks later, renewed recurrence of pain, repetition of the operation. Extensive exposure of the field of operation, detachment and drawing forward of the pinna, the external osseous shell removed with the chisel, scraping out of the morbidly softened bone, opening of the antrum. The process extended to the occipital bone, and the dura mater was exposed to the extent of 1.2 *cm.* in diameter. In the third case there was likewise infiltration of the soft parts around the pinna; on incision a part of the bone showed a blue discoloration, and the opening was begun at this spot, the morbid portions being removed with chisel and spoon. In this case, too, the dura mater was exposed by an opening 5 *mm.* in diameter. The three cases healed under antiseptic treatment.

In conclusion, Bircher cites the various views regarding the performance of the operation and arrives at the view that no positive rule can be laid down, that in every case we must proceed in accordance with the conditions present. If the surface of the bone is softened, we must penetrate from there.

27. Neiling's dissertation is based on four cases in which Es-march successfully performed the artificial opening of the mastoid process.

In the first case, in consequence of purulent otorrhœa, abscess and formation of fistulæ had occurred in the neighborhood of the ear, and at the first presentation the skin from behind the right ear to the middle of the back of the head was hard and swollen, with several fistulous openings. Dilatation of the fistulous openings and removal of the greatly thickened, hard cortical layer with chisel, scraping out of the cellular spaces which were in a state of cheesy degeneration and filled with granulations, removal of the upper part of the posterior wall of the auditory meatus. The second case occurred in a girl aged 13, in whom a pyæmic pleuritis complicated an inflammation of the middle ear of long standing, with polypoid proliferations and œdematous swelling of the mastoid process. In a semi-conscious state of the patient, after in-

cising the cutis immediately behind the attachment of the pinna, a pus-cavity in the mastoid process was opened with a slender drill, and the drill-hole enlarged with the chisel. An abscess cavity, the size of a walnut, filled with cheesy, fœtid masses, was found; this was scraped out with the sharp spoon, and, besides, the posterior wall of the auditory meatus removed. In the third case the mastoid process, containing a collection of pus, was opened with the drill; while, in the fourth case, an abscess cavity was laid open from a fistulous passage with the chisel, and the posterior wall of the auditory meatus was also removed.

Respecting the performance of the operation, Neiling thinks *the one done by Esmarch, drill and chisel operation combined*, the most commendable, and he emphasizes the fact that Esmarch has applied with best effect the method recommended by the Reviewer, based on his anatomical investigations—to furnish the pus a free means of exit toward the auditory meatus.

28. In one of Blau's patients affected with chronic catarrh of the middle ear, there existed at the same time a series of nervous phenomena—a feeling of pressure and fulness in the head, depression of mind, frequent attacks of vertigo, with unsteadiness during walking and standing. The impairment of hearing on both sides was slight; by auscultation a considerable swelling of the mucous membrane of the tube was diagnosed. By the treatment instituted—injection of solutions of zinc sulphate and gargles—the symptoms were quickly removed.

The author then mentions the different nervous symptoms which have been observed to proceed from the ear, especially those caused by foreign bodies, and thinks that in his case likewise the cause of the nervous phenomena has to be sought in the chronic catarrh of the middle ear.

29. In connection with Schwabach's observation communicated in our last report (p. 197), Pflüger reports on a similar case: During the extirpation of a polyp which, as shown by the operation, sprang from the cavity of the tympanum, besides manifestations of vertigo, exceedingly rapid oscillatory movements of both eyes in a horizontal plane occurred. On repeating the operation, and on grasping the polyp with the nippers, the same phenomena recurred. Concerning the manner in which nystagmoid movements of the eyes are produced by the irritation exerted, Pflüger, basing on the experiments of Hitzig and Curschmann, according to which nystagmus may occur during irritation of the flocculus of the

cerebellum and the region of the crura cerebelli, thinks that a direct conduction of the irritation to the peripheral parts of the brain is not improbable.

30. Rouchut in his dissertation discusses the reflex neuroses of children derived from the ear, cephalalgias, mental aberration, and convulsions, and communicates three corresponding cases. In a girl *æt.* 5, in connection with acute amygdalitis, acute otitis had occurred, accompanied by violent pains and intense febrile phenomena. Three attacks of convulsions, lasting ten minutes, with loss of consciousness. Thereafter a transitory discharge from the ear; cure. The second case, seen but twice by the author, happened in a boy of 13, who for three years had suffered from a purulent otorrhœa; in him at times obstinate cephalalgias, deafness, vertigo with falling without loss of consciousness occurred. In a girl of 10, affected with chronic purulent otorrhœa, during suspension of the flow from the ear, attacks of acute mania occurred, which, though of short duration, recurred two or three times per week. Inhalations of chloroform shortened these attacks. Treatment with quinine, 1.0 per diem. After eighteen days' use of the remedy the nervous symptoms disappeared, and discharge from the ear was again established. While the author ascribes the cure to the action of the quinine, it appears at least just as likely that the cure was effected by the retained secretion in some manner finding egress again. An examination of the ear does not appear to have been instituted either in this or the other two cases. In the symptoms discussed, Rouchut thinks to have obtained the best results by the exhibition of quinine, 0.5-1.0 gr. per diem.

31. Levi employs Roustan's method with the air-douche to blow medicated vapors through the tubes. The injection is performed with a rubber bulb, while the patient is directed to make, with mouth closed, a motion as if blowing into a tube.

#### *Nose and Naso-pharyngeal Space.*

32. Ueber Ozäna und eine einfache Behandlungsmethode derselben. [On Ozæna and a simple Method of Treatment of it.] By DR. J. GOTTSTEIN (Breslau). *Berl. klin. Wochenschr.*, No. 37, 1878.

33. Entfernung eines Fremdkörpers aus der Nase. [Removal of a Foreign Body from the Nose.] By DR. BETZ, of Mayence. *Monatschr. f. Ohrenheilkunde*, etc., No. 12, 1878.

34. Ein casuistischer Beitrag zur Aetiologie der Nasenblutungen. [A practical Contribution to the Etiology of Epistaxis.] By DR. LAUDEN, of Elbing. *Berl. klin. Wochenschr.*, No. 49, 1878.

35. Watery Discharge from one Nostril. Communication to the Lond. Clinical Society. By DR. J. PAGET. *Brit. Med. Jour.*, Dec. 7, 1878.

36. Excessive Secretion from the Nose. By J. ALTHAUS. *Brit. Med. Jour.*, Dec. 7, 1878.

37. Ein neuer Catheter zur Auswaschung der Nasenhöhle. [A new Catheter for the Irrigation of the Nasal Cavity.] By DR. A. FISCHER, of Budapest. *Pester chirurg. Presse*, 1878.

38. Les tumeurs adénoïdes, etc. [The adenoid Proliferations of the Naso-pharyngeal Space; their Influence on Hearing, Respiration and Phonation; their Treatment.] By DR. LÖWENBERG. Paris, 1878.

39. Casuistischer Beitrag zur Operation der Nasenrachenpolypen unter Beihilfe der Rhinoscopia anterior. [Practical Contributions to the Operation of Naso-pharyngeal Polyps, assisted by anterior Rhinoscopy.] By PROF. E. ZAUFAL. *Prag. Med. Wochenschr.*, Nos. 17 and 18, 1878.

32. After mentioning the views of Zaufal and Michel regarding the origin of ozæna, Gottstein confirms the surprising concurrence of ozæna with abnormal width of the nasal cavities, and he concludes from his observations on the living that atrophy of the turbinated bones is at the same time joined with atrophy of the Schneiderian membrane. Gotthold does not think the demonstration proved, that in ozæna an increase of secretion is present, and he believes ozæna to be a constant symptom of that stage of chronic rhinitis in which atrophy of the mucous membrane has set in. Destruction of the muciparous glands, diminution and alteration of the secretion which by rapid desiccation remains attached to the mucous membrane, and is decomposed.

In accordance with this conception, Gottstein explains the unfavorable results of our therapeutic measures, and he thought of a simple mode of treatment, which consists of an alternate plugging of the nose with cotton tampons from 3 to 5 cm. long and as thick as the thumb. The cotton tampons remain *in situ* for twenty-four hours, and after removal are found saturated with a yellowish mucus; there is no trace of fœtor, not even when scabs were

present before their insertion. The application of the tampons caused no trouble or inconvenience to the patients, even if allowed to remain over night.

33. In a girl of four years an offensive discharge from the nose had existed for four weeks; examination showed the left lower turbinated bone and the septum greatly swollen; nevertheless, a black body could be recognized about  $1\frac{1}{2}$  cm. from the external opening. It could not be removed with the forceps, and the attempt to push it back so as to bring it into a more favorable position for extraction likewise failed. With a thin galvano-caustic wire the body was severed, and the two halves could be easily extracted with the forceps. The body proved to be a tooth from a hard-rubber comb.

34. One of Laudon's patients, after the last campaign, fell sick of some affection of the liver, pain in the region of the liver, gastric disturbances, icterus. After subsidence of the former troubles the icterus remained. Soon after the first appearance of the affection, the troubles were complicated by epistaxis, first occurring once, later twice daily almost incessantly for seven years, thus materially reducing the patient's strength. Patient complained of a painful feeling of pressure in the left nostril. Examination showed only a moderately inflamed swelling of the mucous membrane, left. Treatment proved unavailing until patient finally, after a violent fit of sneezing, discharged a small parasite from the nose, when complete cure ensued. The parasite, resembling a small earthworm, on close examination proved to be a mite of the genus *Linguatulidæ*, the so-called *Pentastoma tænioides*. The parasite ordinarily infests the frontal and nasal cavities of animals; in some localities (A. v. Humboldt), also those of man. In the human subject the parasite also occurs in the liver.

35. Paget exhibited to the London Clinical Society a fluid discharged from the left nostril of a lady who for eighteen months had suffered from uninterrupted secretion from that nostril. The nature of the fluid was watery, slightly alkaline, with a small admixture of albumen; 120 grm. in one afternoon and evening. She was otherwise healthy, but had received a blow on the forehead two years before. The discharge, however, did not set in until six months later. Paget leaves it undecided whether the fluid originates in the cavities adjoining the nose, in the subarachnoid space, or in the arachnoid sac. Catarrh had not preceded, nor had there ever been a purulent secretion.



36. In connection with Paget's communication, Althaus reports a case in which continued secretion from both nostrils existed, accompanying paralytic phenomena in the region of the trigeminus. Besides, an increased secretion from the mouth was present. A handkerchief held in front of nose and mouth was in a short time saturated with a watery, slightly alkaline fluid. According to Althaus, the secretion of the Schneiderian membrane, brought about by nerve-fibres of the sympathetic, is regulated and inhibited by fibres of the fifth pair. On removing the influence of the latter, the sympathetic fibres obtain the upper hand, and hypersecretion ensues. By the application of the constant current, the excessive secretion was removed.

37. Fischer's pretendedly new nasal catheter consists of a tube which is bent in the shape of a hook at the part to be introduced into the naso-pharyngeal space from the mouth, and ending in a sieve-like perforated knob. The irrigation of the nasal cavity is said to succeed easily and certainly with this instrument.

38. Löwenberg, in his extensive pamphlet (75 pp.) gives an exhaustive representation of the adenoid proliferations, with their etiology, symptomatology, and treatment. Löwenberg appears the more fitted for such a task, as he is one of those who published observations on the affection before the appearance of Meyer's well-known work. The several chapters, especially the symptomatology, are elaborated with the greatest care, and all conditions entering into the consideration are most thoroughly discussed. The habitual cephalalgias caused by adenoid proliferations, given especial prominence by Meyer, which disappear on removing the latter, might perhaps have been mentioned. In the chapter on diagnosis, the rhinoscopic and digital examinations of the naso-pharyngeal space is fully discussed. In order to relax the velum palati during rhinoscopic examination, Löwenberg causes the patient to breathe through the nose and blow air through it. Aside from digital examination, mention might have been made of the examination with the probe, guided by the mirror. For treatment, cauterizations with silver nitrate suffice only in the simpler cases; in operating, Löwenberg employs a forceps with cutting branches; these, having the proper curvature, are introduced from the mouth, guided by the mirror or finger, and the proliferations are grasped and cut off.

39. On the strength of two cases, Zaufal attempts to demonstrate that, in extraordinarily large naso-pharyngeal polyps, an-



terior rhinoscopy may be of greater assistance to the surgeon than posterior.

In the first of the two cases described, he had to deal with nasal polyps, one of which had proliferated into the naso-pharyngeal space and deeply into the lower pharyngeal cavity. By means of the nasal funnel Zaufal was enabled to satisfy himself that the walls of the naso-pharyngeal space were healthy, and that the polyp could not have sprung from them. In conjunction with digital examination a cord was found extending toward the right middle turbinated bone, so that the source had to be looked for in this neighborhood. The bulk of the polyp in the naso-pharyngeal space was removed with the galvano-caustic loop from the left nasal cavity. The remainder, and the polyps situated in the anterior part of the nose, were removed partly with the cold, partly with the hot wire loop. After the removal a transitory ozæna set in. No relapses occurred.

The second case likewise concerned a nasal polyp which had proliferated into the naso-pharyngeal space, and which sprang from the end of the middle turbinated bone. The loop was placed horizontally across the lower margin of the choana, pushed over the polyp with the finger introduced by the mouth, was then brought to a red heat, and the stem severed. The remaining parts were removed in the ordinary manner.